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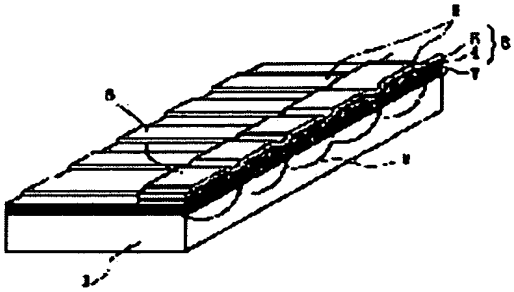
(54) EXPOSURE DEVICE AND IMAGE FORMING DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a small-sized photosensitive material writing device of a reduced cost with can be operated at a high speed with high definition, and simultaneously, can efficiently use light emitted from a light emitting element.
SOLUTION: This exposure device comprises, on a substrate 1, the array of light emitting elements, each of which is composed of at least an anode layer 3, a cathode layer 6 and one or a plurality of organic compound layers 8 sandwiched between the layers 3 and 6. The array of the light emitting elements includes micro lenses 2 and translucent reflection layers 7 on the substrate 1. A micro light resonator structure is configured between the translucent reflection layer 7 and the cathode layer 6. The exposure device has a light emitting peak within the half width range of a sensitivity to a wavelength of a photosensitive body which is exposed to light by the exposure device.



LEGAL STATUS

[Date of request for examination]

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[Date of registration]

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JAPANESE [JP,2000-077188,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

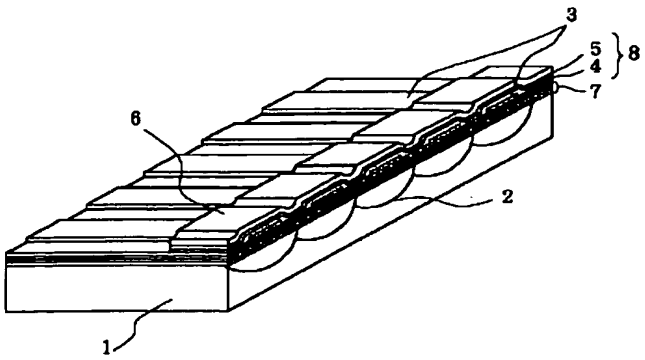
* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] On a substrate, they are an anode plate layer and a catholyte at least. The light-emitting-device array which consists of the monostromatics or the two or more layers organic compound layers which were pinched among these It is the aligner equipped with the above and this light-emitting-device array is characterized by having a luminescence peak within the half-value width of the sensitivity to the wavelength of the photo conductor which has the micro lens in the substrate, has a translucent reflecting layer further, and forms minute optical-resonator structure between this translucent reflecting layer and a catholyte, and is exposed by this aligner.
[Claim 2] The aligner according to claim 1 to which a micro lens is characterized by being a light-emitting part and 1 to 1 correspondence.
[Claim 3] The aligner according to claim 1 or 2 to which opening area of a micro lens is characterized by being larger than the area of a light-emitting part.
[Claim 4] The aligner according to claim 1 to 3 characterized by the focal distance of a micro lens being shorter than the distance between the micro lenses corresponding to a light-emitting part and its light-emitting part.
[Claim 5] The aligner according to claim 1 to 4 characterized by being formed when a micro lens carries out the ion exchange of the substrate of the portion corresponding to a light-emitting part.
[Claim 6] The aligner according to claim 1 to 5 characterized by a micro lens being a micro lens which has a convex lens configuration to a light-emitting part.
[Claim 7] The aligner according to claim 1 to 6 characterized by being formed in the field of the side as the side in which the organic compound layer of a substrate is formed with the same micro lens.
[Claim 8] The aligner according to claim 1 to 7 characterized by forming the micro lens in the field of a side and an opposite side in which the organic compound layer of a substrate is formed.
[Claim 9] The aligner according to claim 1 to 8 characterized by the translucent reflecting layer being in contact with the anode plate layer.
[Claim 10] Image formation equipment characterized by having at least an aligner according to claim 1 to 9 and the photo conductor exposed by this aligner.

[Translation done.]

Drawing selection [Repr sentative drawing]



[Translation done.]

JAPANESE [JP,2000-077188,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the aligner and image formation equipment which are used for electrophotography equipments, such as a copying machine and a printer, especially an optical printer head.
[0002]
[Description of the Prior Art] Conventionally, the laser-beam method, the LED array method, etc. have taken the lead as an exposure method for writing in a latent image on a photo conductor.
[0003] However, in the case of a laser-beam method, optics, such as a polygon mirror and a lens, are needed and there is a problem that ultra-high-speed-izing is also difficult, difficultly [the miniaturization of equipment].
[0004] moreover, in the case of an LED array method, a substrate is expensive, and build an array with one substrate -- since there is nothing, it is necessary to put the started chip in order The level difference during a chip and an interval pose a problem then.
[0005] Moreover, although a rod-lens array is required in order to carry out image formation on a photo conductor, when it is going to carry out image formation of the diffused light by the rod-lens array, the optical incidence efficiency of a rod-lens array is low, and the light in which the light emitting device emitted light cannot be used efficiently. Therefore, in order to obtain the required quantity of light on a photo conductor, the light emitting device had to be made to emit light more than required.
[0006] Furthermore, the luminescence wavelength of the usual organic light emitting device did not be [a quantity of light component which does not suit the sensitivity peak of a photo conductor] and have half-value width efficient for the about 100nm and latus reason.
[0007]
[Problem(s) to be Solved by the Invention] this invention solves the above-mentioned conventional problem, and aims at offering the efficient aligner which can be used and image formation equipment, especially an optical printer head for high speed, small, a low cost, and the quantity of light to which the light emitting device emitted light while it was highly minute.
[0008]
[Means for Solving the Problem] The aligner of this invention is an aligner which has the light-emitting-device array which consists of an anode plate layer and a catholyte, and the monostromatic or the two or more layers organic compound layer pinched among these at least on a substrate. This light-emitting-device array has the micro lens in the substrate, has a translucent reflecting layer further, and forms minute optical-resonator structure between this translucent reflecting layer and a catholyte. And it is characterized by having a luminescence peak within the half-value width of the sensitivity to the wavelength of the photo conductor exposed by this aligner.

[0009] Furthermore, the image formation equipment of this invention is characterized by having at least the above-mentioned aligner and the photo conductor exposed by this aligner.
[0010] By taking such composition, it is possible the aligner which can use efficiently high speed, small, a low cost, and the light that emitted light while it was highly minute, and to specifically offer an optical printer head etc.
[0011]
[Embodiments of the Invention] Hereafter, this invention is explained in detail using a drawing.
[0012] Drawing 1 is the perspective diagram showing an example of the light-emitting-device array which is the aligner of this invention.
[0013] The anode plate layer a micro lens and whose 3 1 is transparent electrodes in drawing 1 as for a substrate and 2, By 6 being an organic compound layer by which a catholyte and 7 are constituted from a translucent reflecting layer, and 8 is constituted from an electron hole transporting bed 4 and an electronic transporting bed 5, and impressing voltage between the anode plate layer 3 and a catholyte 6 It is possible for luminescence to be obtained from the portion (light-emitting part) which the anode plate layer 3 and the catholyte 6 intersect, and to obtain the light-emitting part of arbitrary sizes by changing the electrode width of face of the anode plate layer 3 or a catholyte 6.
[0014] In this invention, a substrate 1 has a micro lens 2. As shown in drawing 1 , the micro lens 2 is formed in a light-emitting part and 1 to 1 correspondence.
[0015] Under the present circumstances, in order to use efficiently the light which emitted light, the one where the opening area of a micro lens 2 is larger than the area of a light-emitting part is desirable. Moreover, in order to obtain the quantity of light efficiently, the one where the focal distance of a micro lens 2 is shorter than the distance between the micro lenses 2 corresponding to a light-emitting part and its light-emitting part is desirable.
[0016] A micro lens 2 is not limited to what is shown in drawing 1 , and just condenses luminescence from a light-emitting part. Specifically, although a micro lens 2 is a micro lens which has a convex lens configuration to a light-emitting part in drawing 1 , it is good also as a micro lens which has a concave lens configuration. Moreover, in drawing 1 , although the micro lens 2 is formed in the field of the same side as the side in which the organic compound layer 8 of a substrate 1 is formed, you may form a micro lens 2 in the field of an opposite side the side in which the organic compound layer 8 of a substrate 1 is formed.
[0017] Moreover, the light-emitting-device array forms minute optical-resonator structure between the translucent reflecting layer 7 and a catholyte 6. For this reason, diffusion of light is suppressed and it becomes possible to lessen the breadth of an exposure spot. Moreover, since the output of peak wavelength can be strengthened while narrowing half-value width of luminescence wavelength, it becomes possible to use the luminescence quantity of light efficiently.
[0018] Furthermore, a light-emitting-device array has a luminescence peak within the half-value width of the sensitivity to the wavelength of the photo conductor exposed. For this reason, a good picture can be acquired, driver voltage can be made low, and an element life can be lengthened.
[0019] It is [that what is necessary is just what can constitute a light emitting device and a micro lens on a front face as a substrate 1] desirable to use transparent insulation substrates, such as glass, such as soda lime glass, and a resin film.
[0020] What carried out the laminating of two or more layers from which it will not be limited especially if it is the composition which can make the reflective permeability of specific wavelength highly or low as a translucent reflecting layer 7, for example, a refractive index differs with the quality of the material, thickness, etc. is desirable. As a material which forms the translucent reflecting layer 7, SiO2 and TiO2 grade are mentioned, for example.
[0021] What has a big work function as a material of the anode plate layer 3 is desirable, for example, can use ITO, a tin oxide, gold, platinum, palladium, a selenium, iridium, copper iodide,

etc. On the other hand, what has a work function small as a material of a catholyte 6 is desirable, for example, can use Mg/Ag, Mg, aluminum, Li(s) and In(s), or these alloys.

[0022] As the organic compound layer 8 may be composition much more, and may be two or more layer composition, for example, is shown in drawing 1 , it consists of an electron hole transporting bed 4 into which an electron hole is poured from the anode plate layer 3, and an electronic transporting bed 5 into which an electron is poured from a catholyte 6, and the electron hole transporting bed 4 or the electronic transporting bed 5 turns into a luminous layer. Moreover, you may prepare the luminous layer containing fluorescence material between the electron hole transporting bed 4 and the electronic transporting bed 5. Moreover, the composition which served both as the electron hole transporting bed 4, the electronic transporting bed 5, and the luminous layer by mixed 1 lamination is also possible.

[0023] As for the material of the organic compound layer 8, it is desirable to choose what considers spectrum luminescence with sensitivity as sensitive material, such as a photoconductor drum to be used.

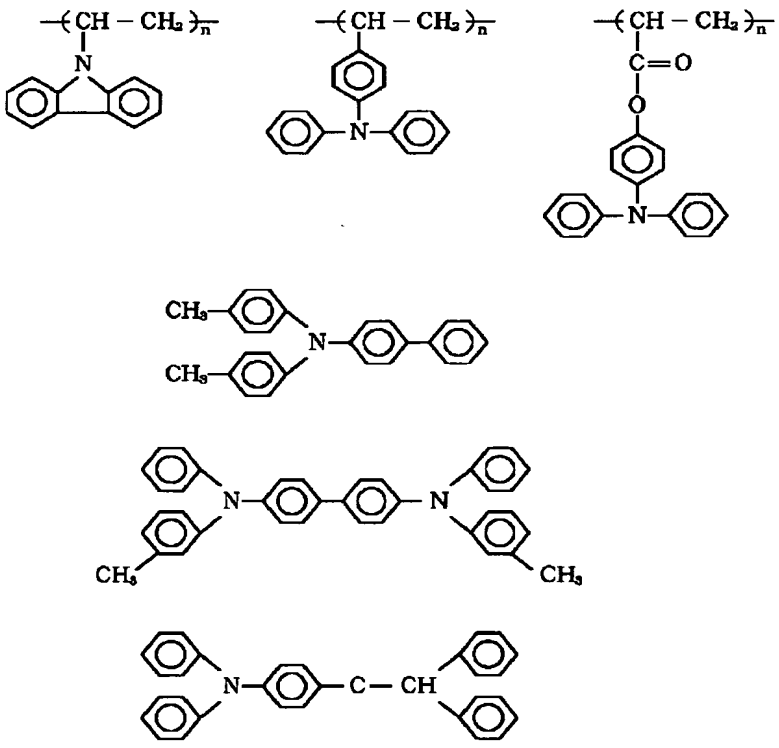
[0024] As an electron hole transporting bed 4, they are N and an N'-screw (3-methylphenyl), for example. - They are N and N'-diphenyl. - (1 and 1'-biphenyl) -4 and a 4'-diamine (henceforth, TPD) can be used, in addition the following organic material can be used.

[0025]

[Formula 1]

ホール輸送性化合物

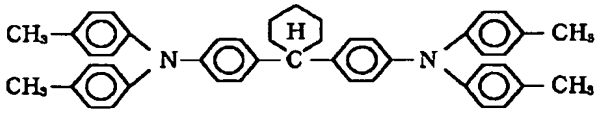
ホール輸送体

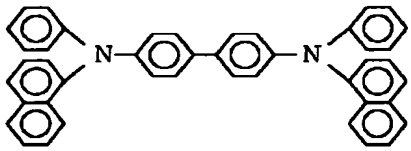


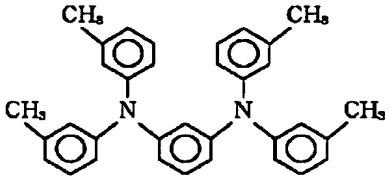
[0026]

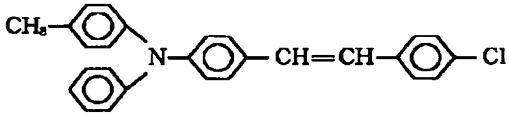
[Formula 2]

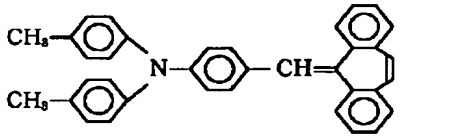
ホール輸送性化合物





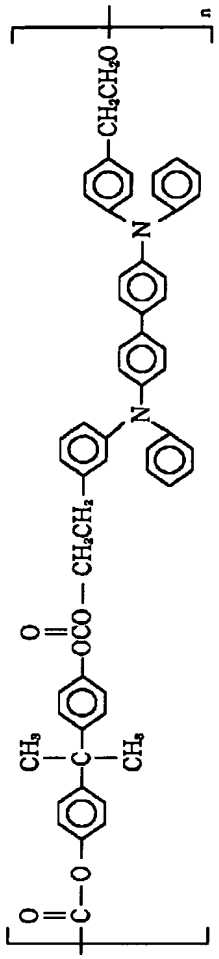






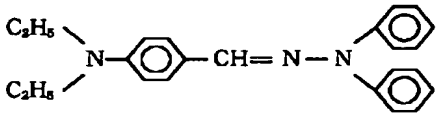
[0027]
[Formula 3]

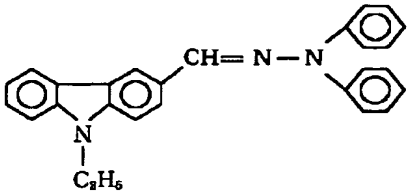
ホール輸送性化合物

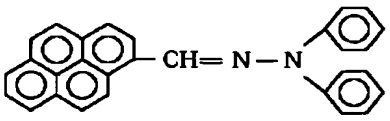


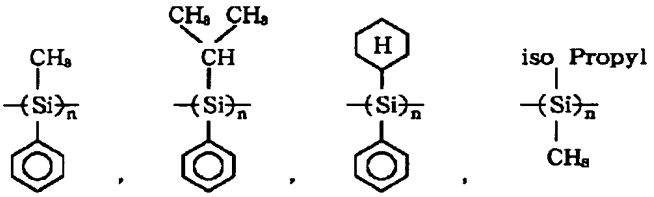
[0028]
[Formula 4]

ホール輸送性化合物

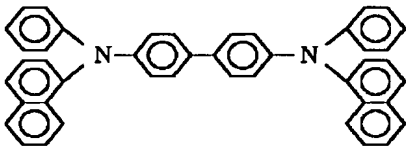


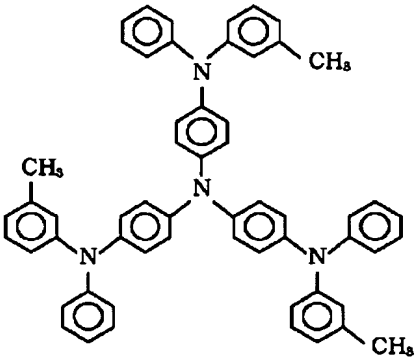






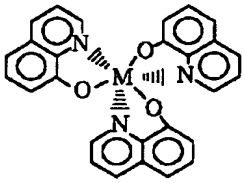
[0029]
[Formula 5]
ホール輸送性化合物



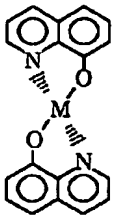


[0030] Moreover, you may use inorganic material, such as a-Si and a-SiC, for example.
[0031] As an electronic transporting bed 5, tris (eight quinolinol) aluminum (henceforth, Alq3) can be used, in addition the following material can be used, for example.
[0032]
[Formula 6]

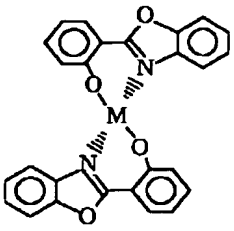
電子輸送性化合物



M : Al, Ga



M : Zn, Mg, Be



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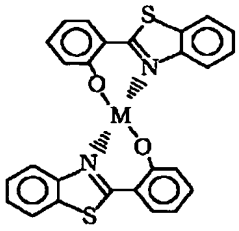
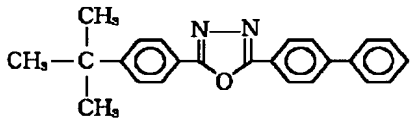
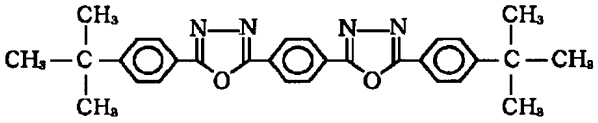


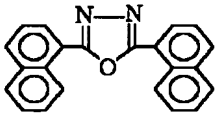
M : Zn, Mg, Be

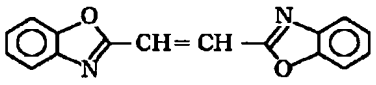
[0033]
[Formula 7]

電子輸送性化合物



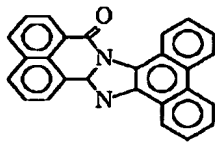


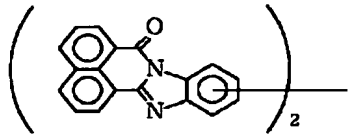


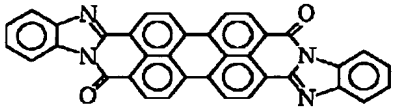


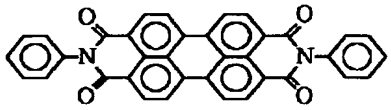
[0034]
[Formula 8]

電子輸送性化合物



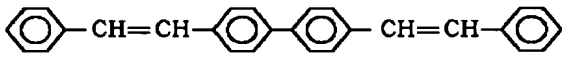


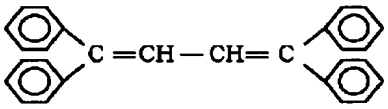


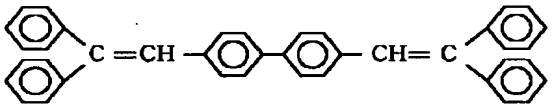


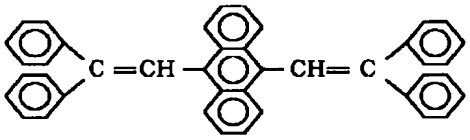
[0035]
[Formula 9]

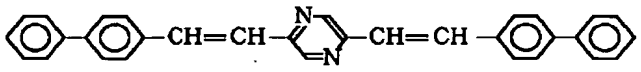
電子輸送性化合物

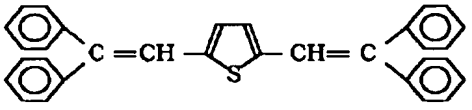






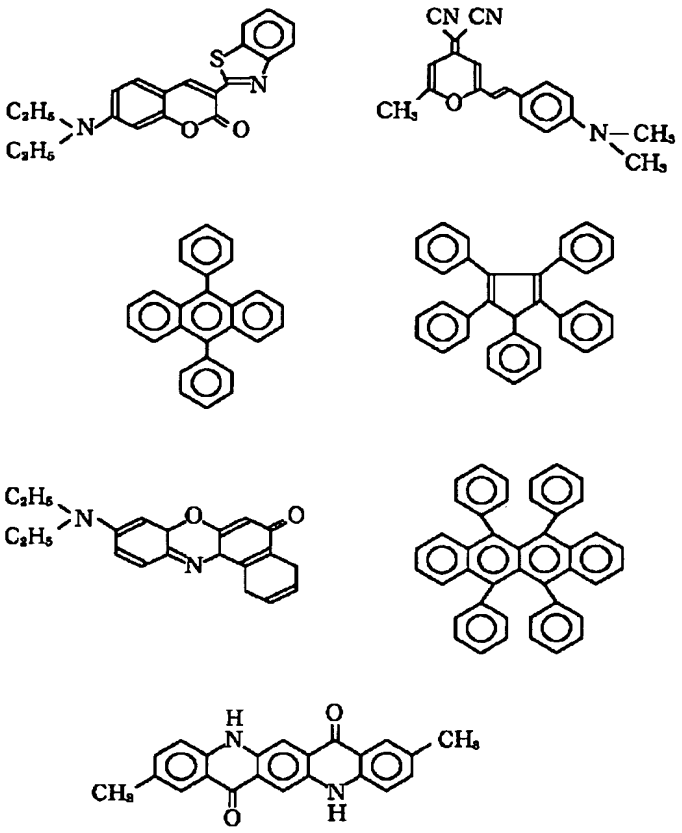






[0036] Moreover, DOPANDO coloring matter as shown below can also be doped to the electronic transporting bed 5 or the electron hole transporting bed 4.
[0037]
[Formula 10]

ドーパンド色素



[0038] Although especially the thickness of each class etc. is not limited, it is desirable to optimize so that the spectrum whose sensitivity suited to the photo conductor can be taken out.
[0039] In addition, the laminating of a catholyte, an organic compound layer, an anode plate layer, and the translucent reflecting layer may be carried out one by one, finally a micro lens may be formed on the reverse order of a laminating, i.e., a substrate, and a light-emitting-device array may be constituted.
[0040] Hereafter, an example of the production process of the light-emitting-device array of this invention is explained along with drawing 2 .
[0041] a) Production of a micro lens 2 (drawing 2 (a))
A micro lens 2 can be formed by carrying out the ion exchange of the substrate 1 of the portion corresponding to a light-emitting part.
[0042] First, both sides of a substrate 1 are fully washed. Next, the mask of the substrate 1 whole is carried out with the film of ion nontransparent nature, such as Ti. An opening train is formed in Ti of an ionic diffusion side at intervals of a desired diameter and a center by the FOTORISO etching method. This substrate is dipped in fused salt, such as nitrates, such as mixed fused salt of TINO3 and KNO3, Ag+, and Tl+, and a sulfate, in order to perform an ion exchange treatment, and the semi-sphere-like micro lens 2 is formed.
[0043] Under the present circumstances, the refractive-index distribution of a micro lens 2 may be divided for how many step story being, and may be formed.
[0044] Moreover, especially the formation method of a micro lens 2 is not limited, but as shown in the example mentioned later, you may form it by a method, a replica method, etc. using a photoresist.
[0045] b) As shown in drawing 2 (b), form the translucent reflecting layer 7 which consists of two or more layers by the spatter on the field in which the micro lens 2 was formed.

[0046] c) As shown in drawing 2 (b), adjust line width of face and a pitch, put a metal mask, and form the anode plate layer 3 in predetermined thickness by the spatter so that the anode plate layer 3 may be in the portion corresponding to a micro lens 2.
[0047] d) As shown in drawing 2 (d), carry out the vacuum evaporationo of the electron hole transporting bed 4 and the electronic transporting bed 5 by the vacuum deposition method one by one.
[0048] e) As shown in drawing 2 (e), as it laps with the train of a micro lens 2, put the metal mask of desired line width of face on it, and form a catholyte 6.
[0049] The outline block diagram of image formation equipment using the electrophotography method as an example of the image formation equipment of this invention is shown in drawing 3 .
[0050] For an electrification means and 213, as for an imprint means and 215, a development means and 214 are [the electrophotography photo conductor of the rotating-drum type / 211 / as an image support, and 212 / a fixing means and 216] cleaning meanses.
[0051] The aligner (un-illustrating) of this invention is used as exposure L. If the driver for a drive is connected to an aligner, an anode plate layer is added, a catholyte is made minus and direct current voltage is impressed, green luminescence can be obtained from a light-emitting part, image formation can be carried out on a photo conductor 211, and a good picture can be acquired.
[0052] A photo conductor 211 top is uniformly charged by the electrification means 212. The exposure L by the aligner is made corresponding to the time series electrical-and-electric-equipment digital pixel signal of image information to be outputted to the electrification side of this photo conductor 211, and the electrostatic latent image corresponding to the target image information is formed to the peripheral surface of a photo conductor 211. The electrostatic latent image is developed as a toner image by the development means 213 which used the insulating toner. It is introduced into the pressure-welding nip section (imprint section) T of a photo conductor 211 and the contact imprint means made to contact this by the predetermined press force to predetermined timing, and imprints by supplying the imprint material p as record material from the feed section (un-illustrating), and on the other hand, impressing predetermined imprint bias voltage.
[0053] It dissociates from the field of a photo conductor 211, and the imprint material P which received the imprint of a toner picture is introduced to the fixing meanses 215, such as a heat fixing method, receives fixing of a toner picture, and is discharged out of equipment as an image formation object (print). Moreover, the photo conductor side after the toner picture imprint to the imprint material P is cleaned by the cleaning means 216 in response to removal of adhesion contaminations, such as a remains toner, and imaging is repeatedly presented with it.
[0054] The outline block diagram of multi-colored picture image formation equipment using the electrophotography method as other examples of the image formation equipment of this invention is shown in drawing 4 .
[0055] C1-C4 -- an electrification means, and D1-D4 -- for a development sleeve, and T1-T4, an imprint blade, and TR1-TR2 are [the exposure means of this invention, and S1-S4 / a development means, and E1-E4 / an imprint belt and P of a roller and TF1] a transfer paper and the electrophotography photo conductor of a rotating-drum type [304 / 301-304 / a fixing assembly, and
[0056] A transfer paper P is conveyed in the direction of an arrow, is drawn on the imprint belt TF 1 by which suspension was carried out to rollers TR1 and TR2, and moves to the black imprint position set up so that it might be pinched by a photo conductor 301 and the imprint blade T1 with the imprint belt TF 1. At this time, the photo conductor 301 has the toner picture of the black of a request by the electrophotography process by the development sleeve S1 of the electrification means C1 arranged on a drum periphery, the exposure means E1, and the development means D1, and the imprint of a black toner picture is performed to a transfer paper P.

[0057] The cyano imprint position set up so that a transfer paper P might be pinched by a photo conductor 302 and the imprint blade T2 with the imprint belt TF 1, It moves to the Magenta imprint position set up so that it might be pinched by a photo conductor 303 and the imprint blade T3, and the yellow imprint position set up so that it might be pinched by a photo conductor 304 and the imprint blade T4. in the imprint position of it that The imprint of a cyano toner picture, a Magenta toner picture, and a yellow toner picture is performed by the same means as a black imprint position.
[0058] Since each photo conductors 301-304 are performing good rotation at this time, between each record, registration of a picture can be performed good. The transfer paper P which performed multicolor record according to the above process can be established by the ability supplying a fixing assembly F1, and can obtain a desired multi-colored picture image.
[0059]
[Example] (Example 1) The light-emitting-device array shown in drawing 1 in the procedure shown in drawing 2 was produced.
[0060] The micro lens 2 is formed in the portion corresponding to each light-emitting part in the transparent insulating substrate 1 by the ion-exchange method, and the laminating of a dielectric layer 7, the anode plate layer 3, the electron hole transporting bed 4, the electronic transporting bed 5 that served both as the luminous layer, and the catholyte 6 is carried out on it.
[0061] First, the creation method of the micro lens 2 of a substrate 1 is explained.
[0062] In this example, the soda lime glass substrate was used as a transparent insulating substrate 1. Both sides of this glass substrate are fully washed.
[0063] Next, the mask of the whole glass substrate is carried out with Ti film. A main interval forms in Ti of an ionic diffusion side the opening train which is 80 micrometers for the diameter of 30 micrometers by the FOTORISO etching method.
[0064] This substrate is dipped in the mixed fused salt of TINO3 and KNO3, in order to perform the ion exchange, and the semi-sphere-like refractive-index field (micro lens) 2 whose diameter is about 70 micrometers is formed.
[0065] Next, the creation method of a light-emitting-device array is explained.
[0066] the field top in which the micro lens 2 was formed -- a spatter -- the SiO two-layer of 93nm of thickness -- 21 and the TiO two-layer of 59nm of thickness -- the laminating of 22 is carried out by turns, and the translucent reflecting layer 2 is formed
[0067] Next, ITO is formed as an anode plate layer 3. Line width of face of 50 micrometers and a pitch 80micrometer metal mask are put, and 60nm of ITO(s) is formed by the spatter so that ITO may be in the portion corresponding to a micro lens 2.
[0068] Next, 50nm vacuum evaporationo of the 40nm of Alq(s)3 is carried out for TPD by the vacuum deposition method one by one as an electronic transporting bed 5 as an electron hole transporting bed 4, respectively. In addition, the degree of vacuum at the time of vacuum evaporationo is 2 - 3x10-6Torr, and membrane formation speed was carried out innm [0.2-0.3 //s].
[0069] It intersects perpendicularly with the anode plate layer 2, finally, a metal mask with a line width of face of 40 micrometers is put on it, as it laps with the train of a micro lens 2, vapor codeposition is carried out to Ag by the evaporation-rate ratio of Mg and10:1 as a catholyte 6, and Mg/Ag forms 200nm of 10/1 of alloys. Membrane formation speed was made into 1 nm/s at this time.
[0070] The ffective-area product of a micro lens 2 is made larger than the area of a light-emitting part, and it is made to obtain efficiently the light which emitted light.
[0071] Thus, when the Mg/Ag electrode which are plus and a catholyte about the ITO electrode which is an anode plate layer was made minus and direct current voltage was impressed to the obtained light-emitting-device array, green luminescence was obtained from the portion which the ITO electrode and the Mg/Ag electrode intersect.

[0072] The driver for a drive was connected to the light-emitting-device array (example of comparison) which changed thickness, such as this light-emitting-device array, and a translucent reflecting layer, an organic compound layer, it wrote in the photo conductor as the light source for electrophotography, and the picture was actually outputted. The sensitivity property of a photo conductor and the emission spectrum of a light-emitting-device array are shown in drawing 5 .

[0073] As shown in drawing 5 , the light-emitting-device array of an example 1 has an emission peak wavelength within the half-value width of the sensitivity of a photo conductor, and was able to acquire the good picture. On the other hand, since there was no luminescence peak within the half-value width of the sensitivity of a photo conductor, it could not lower to the potential of a request of the potential of a photo conductor, but the picture faded, and the light-emitting-device array of the example of comparison was not able to acquire a good picture.

[0074] Furthermore, when some kinds of light-emitting-device arrays from which an emission peak wavelength differs are produced and a picture output is performed, in order to acquire a good picture, it was required to have an emission peak wavelength within the half-value width of the sensitivity of a photo conductor at least. Although a good picture can be acquired by making driver voltage high even if it does not have an emission peak wavelength within the half-value width of the sensitivity of a photo conductor, the problem that an element life becomes short in this case generates and is not desirable.

[0075] Thus, while diffusion of light was suppressed and the breadth of an exposure spot was lessened by using the light-emitting-device array which has a micro lens and optical-resonator structure, it became possible to carry out image formation on a photo conductor by the micro lens. Moreover, since the output of peak wavelength was strengthened while narrowing half-value width of luminescence wavelength, it became possible to use the luminescence quantity of light efficiently.

[0076] In this example, although the light-emitting-device array of 300dpi was created, it is changing electrode width of face, and it is possible to acquire the point of arbitrary sizes emitting light.

[0077] (Example 2) Drawing 6 is the cross section of the light-emitting-device array of this example.
 [0078] The micro lens 24 which has a convex lens configuration is formed in the portion corresponding to each light-emitting part at the glass substrate carried out substrate 1, and the laminating of the translucent reflecting layer 7, the anode plate layer 3, the electron hole transporting bed 4, the electronic transporting bed 5 that served both as the luminous layer, and the catholyte 6 is carried out on it.

[0079] First, the creation method of the micro lens 24 on a glass substrate is explained.

[0080] Since there are ultraviolet [usual] and a photoresist for far-ultraviolet as a material for forming a lens, especially photoresists for positive-type far-ultraviolet, such as a polymethylmethacrylate system, a PMIPK system, the poly glycyl methyl acrylate system, and a phenol novolak system, soften at low temperature comparatively and it is easy to form a condenser lens configuration, it is desirable.

[0081] The laminating of the photoresist which was described above on the glass substrate is carried out by methods, such as an application, and patterning of the photoresist layer is carried out using pattern formation methods, such as the lift-off method and the dry etching method, so that a main interval may be set to 80 micrometers for the diameter of 70 micrometers by the FOTORISO method. This photoresist by which patterning was carried out is made to soften and fluidize with annealing, and the circular micro lens 24 is formed.

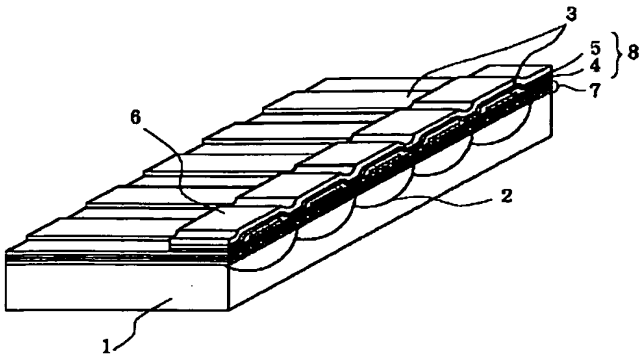
[0082] Next, after forming the translucent reflecting layer 7 like an example 1, line width of face of 50 micrometers and a pitch 80micrometer metal mask are put, and 60nm of ITO(s) is formed by the spatter as an anode plate layer 3 so that it may correspond to a micro lens 24.

[0083] Next, the vacuum evaporationo of Alq3 is carried out for TPD by the vacuum deposition

method one by one as an electronic transporting bed 5 as an electron hole transporting bed 4 like an example 1. In addition, the degree of vacuum at the time of vacuum evaporationo is two to 3x10-6, and membrane formation speed was carried out innm [0.2-0.3 //s].
[0084] Finally, a metal mask with a line width of face of 40 micrometers is put on it, as it laps with the train of a micro lens 24, vapor codeposition of Ag is carried out by the evaporation-rate ratio of Mg and10:1 as a catholyte 6, and Mg/Ag forms 200nm of 10/1 of alloys. Membrane formation speed was made into 1 nm/s at this time.
[0085] Thus, the driver for a drive was connected to the obtained light-emitting-device array, and it used as the light source for electrophotography. Like the example 1, green luminescence was able to be obtained from the crossing portion, image formation of an ITO electrode and the Mg/Ag electrode was able to be carried out on the photoconductor drum side through the translucent reflecting layer 7 and the micro lens 24, and the good picture was able to be acquired.
[0086] Thus, it became realizable [the optical printer head from which a high definition picture is acquired with low power] by giving optical-resonator structure to a light-emitting-device array.
[0087] (Example 3) The organic LED array shown in drawing 7 in the procedure shown in drawing 8 was produced.
[0088] On the glass substrate as a substrate 1, the micro lens 25 which has a convex lens configuration into the portion corresponding to each light-emitting part is formed, and the laminating of the electronic transporting bed 5 which served both as the translucent reflecting layer 7, the anode plate layer 3, the electron hole transporting bed 4, and the luminous layer to the field of a micro lens 25 and an opposite side to the substrate 1, and the catholyte 6 is carried out.
[0089] First, the creation method of the micro lens 25 on a glass substrate is explained. As shown in drawing 8 (a), a micro lens 25 forms the array 75 micrometers and whose main interval the diameter of opening is 80 micrometers by the replica method. And the translucent reflecting layer 7 is formed in the field of a micro lens 25 and an opposite side like an example 1.
[0090] As shown in drawing 8 (b), line width of face of 50 micrometers and a pitch 80micrometer metal mask are put on the field in which the micro lens 25 was formed, and the field of an opposite side, and 60nm of ITO(s) is formed in them by the spatter as an anode plate layer 3 so that it may correspond to a micro lens 25.
[0091] Next, as shown in drawing 8 (c), the vacuum evaporationo of Alq3 is carried out for TPD by the vacuum deposition method one by one as an electronic transporting bed 5 as an electron hole transporting bed 4 like an example 1.
[0092] Finally, as shown in drawing 8 (d), a metal mask with a line width of face of 40 micrometers is put on it, as it laps with the train of a micro lens 25, vapor codeposition of Ag is carried out by the evaporation-rate ratio of Mg and10:1 as a catholyte 6, and Mg/Ag forms 200nm of 10/1 of alloys.
[0093] Thus, the driver for a drive was able to be connected to the obtained organic LED array, and the good picture was able to obtain by using as the light source for electrophotography.
[0094]
[Effect of the Invention] As explained above, according to this invention, it becomes possible to offer the efficient aligner and efficient image formation equipments which can be used, such as an optical printer head, about high speed, small, a low cost, and the quantity of light to which the light emitting device emitted light while it was highly minute.

[Translation done.]

Drawing selection [Repres ntative drawing]



[Translation done.]

JAPANESE [JP,2000-077188,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

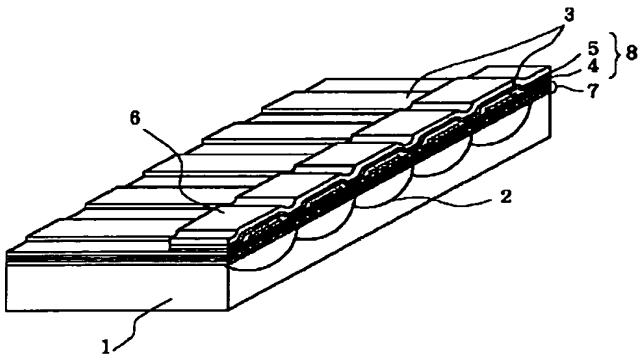
* NOTICES *

TECHNICAL FIELD

[The technical field to which invention belongs] this invention relates to the aligner and image formation equipment which are used for electrophotography equipments, such as a copying machine and a printer, especially an optical printer head.

[Translation done.]

Drawing selection [R presentative drawing]



[Translation done.]

JAPANESE [JP,2000-077188,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

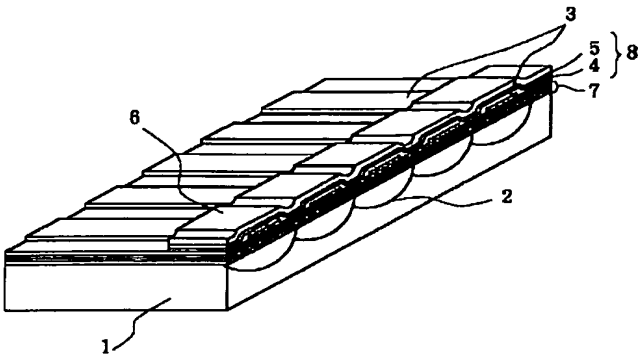
[Translation done.]

PRIOR ART

[Description of the Prior Art] Conventionally, the laser-beam method, the LED array method, etc. have taken the lead as an exposure method for writing in a latent image on a photo conductor.
[0003] However, in the case of a laser-beam method, optics, such as a polygon mirror and a lens, are needed and there is a problem that ultra-high-speed-izing is also difficult, difficultly [the miniaturization of equipment].
[0004] moreover, in the case of an LED array method, a substrate is expensive, and build an array with one substrate -- since there is nothing, it is necessary to put the started chip in order The level difference during a chip and an interval pose a problem then.
[0005] Moreover, although a rod-lens array is required in order to carry out image formation on a photo conductor, when it is going to carry out image formation of the diffused light by the rod-lens array, the optical incidence efficiency of a rod-lens array is low, and the light in which the light emitting device emitted light cannot be used efficiently. Therefore, in order to obtain the required quantity of light on a photo conductor, the light emitting device had to be made to emit light more than required.
[0006] Furthermore, the luminescence wavelength of the usual organic light emitting device did not be [a quantity of light component which does not suit the sensitivity peak of a photo conductor] and have half-value width efficient for the about 100nm and latus reason.

[Translation done.]

Drawing selection [Repres ntative drawing]



[Translation done.]

JAPANESE [JP,2000-077188,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

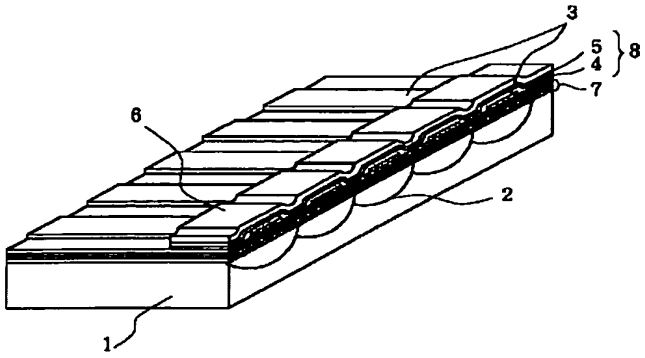
* NOTICES *

EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, according to this invention, it becomes possible to offer the efficient aligner and efficient image formation equipments which can be used, such as an optical printer head, about high speed, small, a low cost, and the quantity of light to which the light emitting device emitted light while it was highly minute.

[Translation done.]

Drawing selection [Representativ drawing]



[Translation done.]

JAPANESE [JP,2000-077188,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

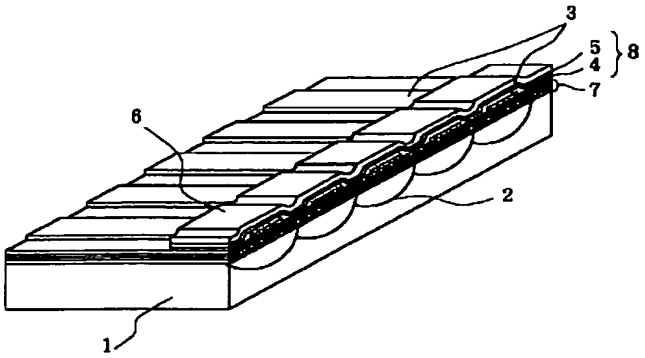
* NOTICES *

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] this invention solves the above-mentioned conventional problem, and aims at offering the efficient aligner which can be used and image formation equipment, especially an optical printer head for high speed, small, a low cost, and the quantity of light to which the light emitting device emitted light while it was highly minute.

[Translation done.]

Drawing selection [Representative drawing]



[Translation done.]

JAPANESE [JP,2000-077188,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

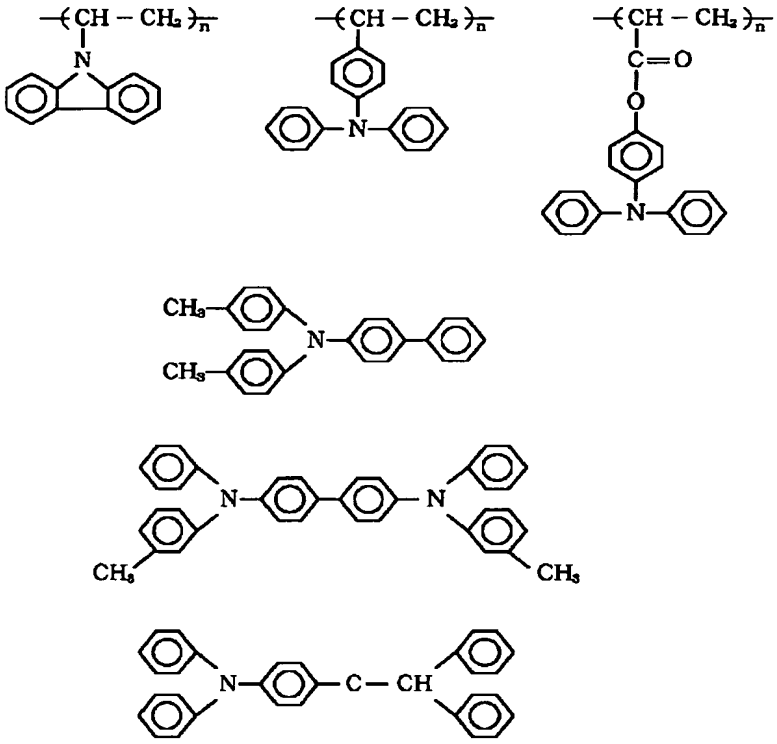
MEANS

[Means for Solving the Problem] The aligner of this invention is an aligner which has the light-emitting-device array which consists of an anode plate layer and a catholyte, and the monostromatic or the two or more layers organic compound layer pinched among these at least on a substrate. This light-emitting-device array has the micro lens in the substrate, has a translucent reflecting layer further, and forms minute optical-resonator structure between this translucent reflecting layer and a catholyte. And it is characterized by having a luminescence peak within the half-value width of the sensitivity to the wavelength of the photo conductor exposed by this aligner.
[0009] Furthermore, the image formation equipment of this invention is characterized by having at least the above-mentioned aligner and the photo conductor exposed by this aligner.
[0010] By taking such composition, it is possible the aligner which can use efficiently high speed, small, a low cost, and the light that emitted light while it was highly minute, and to specifically offer an optical printer head etc.
[0011]
[Embodiments of the Invention] Hereafter, this invention is explained in detail using a drawing.
[0012] Drawing 1 is the perspective diagram showing an example of the light-emitting-device array which is the aligner of this invention.
[0013] The anode plate layer a micro lens and whose 3 1 is transparent electrodes in drawing 1 as for a substrate and 2, By 6 being an organic compound layer by which a catholyte and 7 are constituted from a translucent reflecting layer, and 8 is constituted from an electron hole transporting bed 4 and an electronic transporting bed 5, and impressing voltage between the anode plate layer 3 and a catholyte 6 It is possible for luminescence to be obtained from the portion (light-emitting part) which the anode plate layer 3 and the catholyte 6 intersect, and to obtain the light-emitting part of arbitrary sizes by changing the electrode width of face of the anode plate layer 3 or a catholyte 6.
[0014] In this invention, a substrate 1 has a micro lens 2. As shown in drawing 1 , the micro lens 2 is formed in a light-emitting part and 1 to 1 correspondence.
[0015] Under the present circumstances, in order to use efficiently the light which emitted light, the one where the opening area of a micro lens 2 is larger than the area of a light-emitting part is desirable. Moreover, in order to obtain the quantity of light efficiently, the one where the focal distance of a micro lens 2 is shorter than the distance between the micro lenses 2 corresponding to a light-emitting part and its light-emitting part is desirable.
[0016] A micro lens 2 is not limited to what is shown in drawing 1 , and just condenses luminescence from a light-emitting part. Specifically, although a micro lens 2 is a micro lens which has a convex lens configuration to a light-emitting part in drawing 1 , it is good also as a micro lens which has a concave lens configuration. Moreover, in drawing 1 , although the micro lens 2 is formed in the field of the same side as the side in which the organic compound layer 8 of a substrate 1 is formed, you may form a micro lens 2 in the field of an opposite side the side

in which the organic compound layer 8 of a substrate 1 is formed.
[0017] Moreover, the light-emitting-device array forms minute optical-resonator structure between the translucent reflecting layer 7 and a catholyte 6. For this reason, diffusion of light is suppressed and it becomes possible to lessen the breadth of an exposure spot. Moreover, since the output of peak wavelength can be strengthened while narrowing half-value width of luminescence wavelength, it becomes possible to use the luminescence quantity of light efficiently.
[0018] Furthermore, a light-emitting-device array has a luminescence peak within the half-value width of the sensitivity to the wavelength of the photo conductor exposed. For this reason, a good picture can be acquired, driver voltage can be made low, and an element life can be lengthened.
[0019] It is [that what is necessary is just what can constitute a light emitting device and a micro lens on a front face as a substrate 1] desirable to use transparent insulation substrates, such as glass, such as soda lime glass, and a resin film.
[0020] What carried out the laminating of two or more layers from which it will not be limited especially if it is the composition which can make the reflective permeability of specific wavelength highly or low as a translucent reflecting layer 7, for example, a refractive index differs with the quality of the material, thickness, etc. is desirable. As a material which forms the translucent reflecting layer 7, SiO2 and TiO2 grade are mentioned, for example.
[0021] What has a big work function as a material of the anode plate layer 3 is desirable, for example, can use ITO, a tin oxide, gold, platinum, palladium, a selenium, iridium, copper iodide, etc. On the other hand, what has a work function small as a material of a catholyte 6 is desirable, for example, can use Mg/Ag, Mg, aluminum, Li(s) and In(s), or these alloys.
[0022] As the organic compound layer 8 may be composition much more, and may be two or more layer composition, for example, is shown in drawing 1 , it consists of an electron hole transporting bed 4 into which an electron hole is poured from the anode plate layer 3, and an electronic transporting bed 5 into which an electron is poured from a catholyte 6, and the electron hole transporting bed 4 or the electronic transporting bed 5 turns into a luminous layer. Moreover, you may prepare the luminous layer containing fluorescence material between the electron hole transporting bed 4 and the electronic transporting bed 5. Moreover, the composition which served both as the electron hole transporting bed 4, the electronic transporting bed 5, and the luminous layer by mixed 1 lamination is also possible.
[0023] As for the material of the organic compound layer 8, it is desirable to choose what considers spectrum luminescence with sensitivity as sensitive material, such as a photoconductor drum to be used.
[0024] As an electron hole transporting bed 4, they are N and an N'-screw (3-methylphenyl), for example. - They are N and N'-diphenyl. - (1 and 1'-biphenyl) -4 and a 4'-diamine (henceforth, TPD) can be used, in addition the following organic material can be used.
[0025]
[Formula 1]

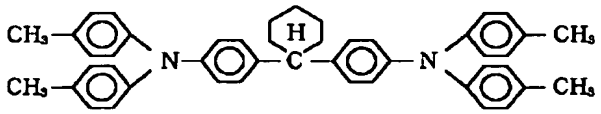
ホール輸送性化合物

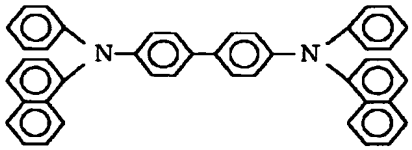
ホール輸送体

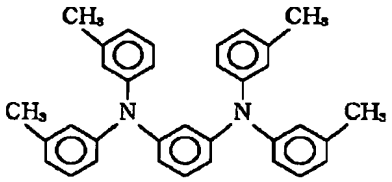


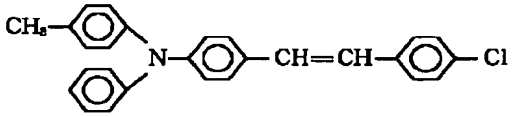
[0026]
[Formula 2]

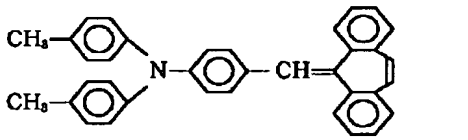
ホール輸送性化合物





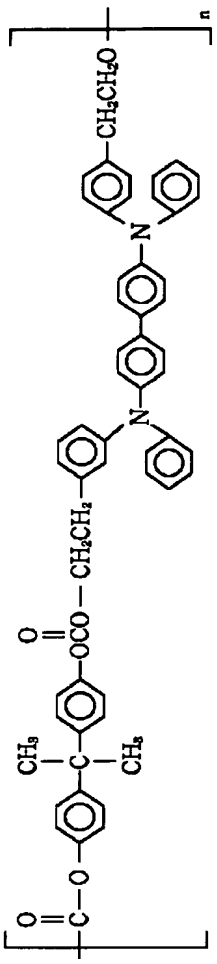






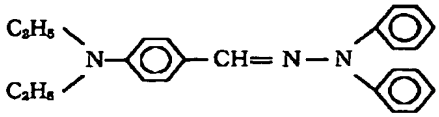
[0027]
[Formula 3]

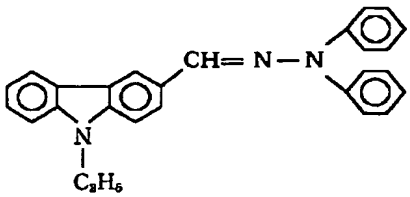
ホール輸送性化合物

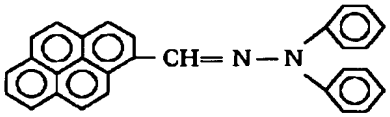


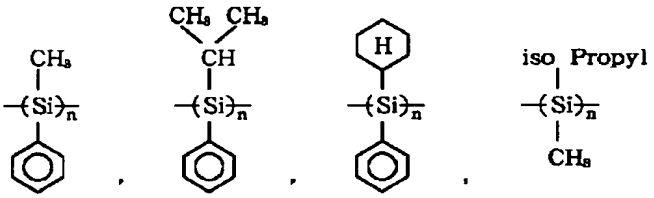
[0028]
[Formula 4]

ホール輸送性化合物

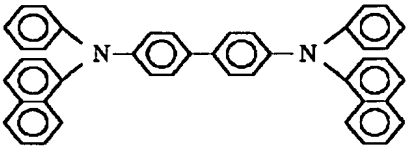


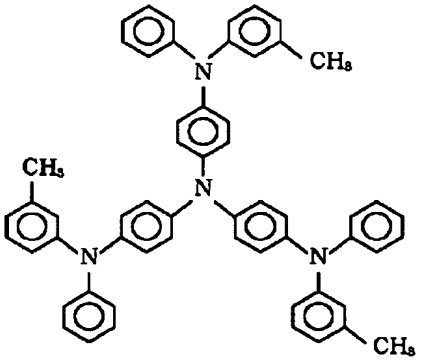






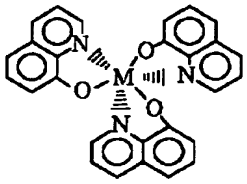
[0029]
[Formula 5]
ホール輸送性化合物



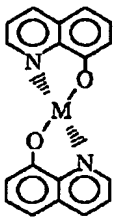


[0030] Moreover, you may use inorganic material, such as a-Si and a-SiC, for example.
[0031] As an electronic transporting bed 5, tris (eight quinolinol) aluminum (henceforth, Alq3) can be used, in addition the following material can be used, for example.
[0032]
[Formula 6]

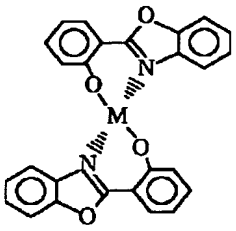
電子輸送性化合物



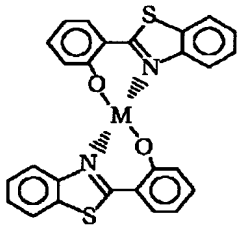
M : Al, Ga



M : Zn, Mg, Be



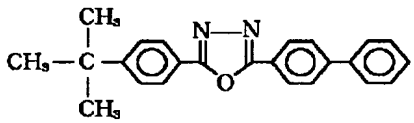
M : Zn, Mg, Be

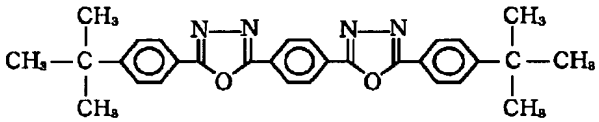


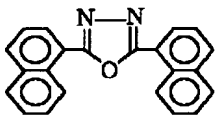
M : Zn, Mg, Be

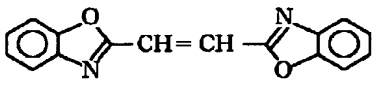
[0033]
[Formula 7]

電子輸送性化合物



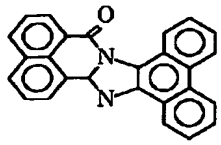


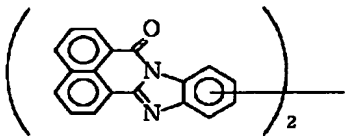


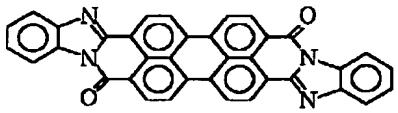


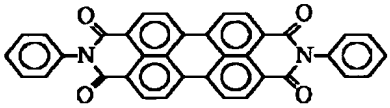
[0034]
[Formula 8]

電子輸送性化合物



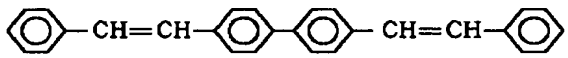


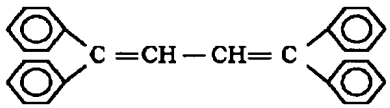


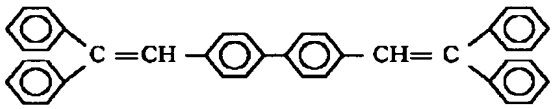


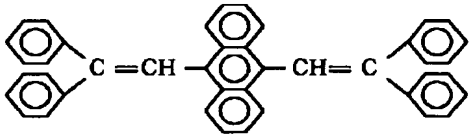
[0035]
[Formula 9]

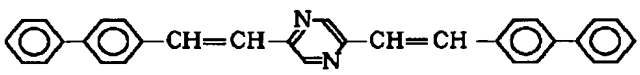
電子輸送性化合物

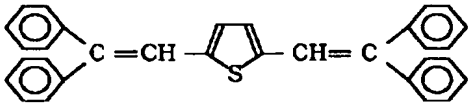






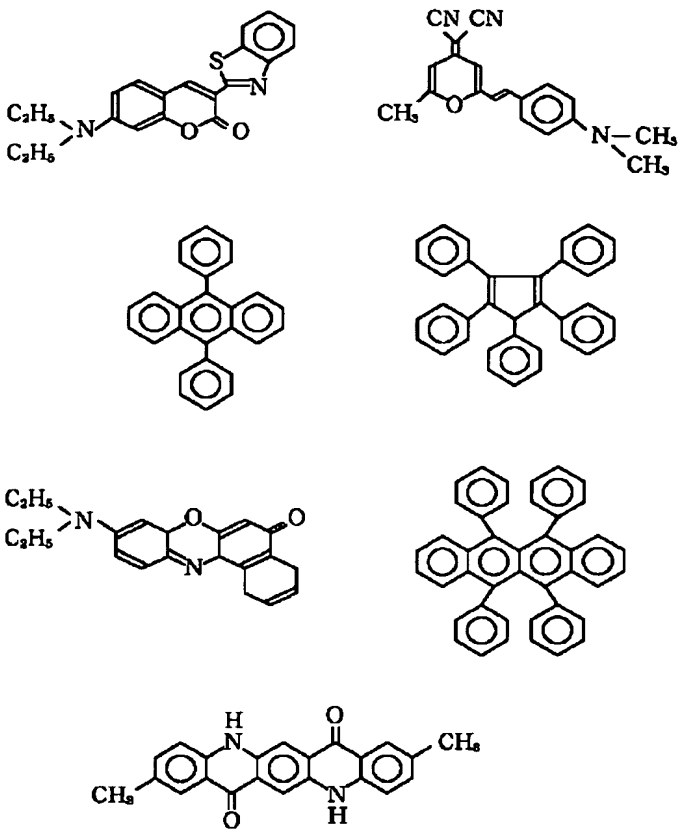






[0036] Moreover, DOPANDO coloring matter as shown below can also be doped to the electronic transporting bed 5 or the electron hole transporting bed 4.
[0037]
[Formula 10]

ドーパンド色素



[0038] Although especially the thickness of each class etc. is not limited, it is desirable to optimize so that the spectrum whose sensitivity suited to the photo conductor can be taken out.

[0039] In addition, the laminating of a catholyte, an organic compound layer, an anode plate layer, and the translucent reflecting layer may be carried out one by one, finally a micro lens may be formed on the reverse order of a laminating, i.e., a substrate, and a light-emitting-device array may be constituted.

[0040] Hereafter, an example of the production process of the light-emitting-device array of this invention is explained along with drawing 2 .

[0041] a) Production of a micro lens 2 (drawing 2 (a))

A micro lens 2 can be formed by carrying out the ion exchange of the substrate 1 of the portion corresponding to a light-emitting part.

[0042] First, both sides of a substrate 1 are fully washed. Next, the mask of the substrate 1 whole is carried out with the film of ion nontransparent nature, such as Ti. An opening train is formed in Ti of an ionic diffusion side at intervals of a desired diameter and a center by the FOTORISO etching method. This substrate is dipped in fused salt, such as nitrates, such as mixed fused salt of TINO3 and KNO3, Ag+, and Tl+, and a sulfate, in order to perform an ion exchange treatment, and the semi-sphere-like micro lens 2 is formed.

[0043] Under the present circumstances, the refractive-index distribution of a micro lens 2 may be divided for how many step story being, and may be formed.

[0044] Moreover, especially the formation method of a micro lens 2 is not limited, but as shown in the exampl mentioned later, you may form it by a method, a replica method, etc. using a photoresist.

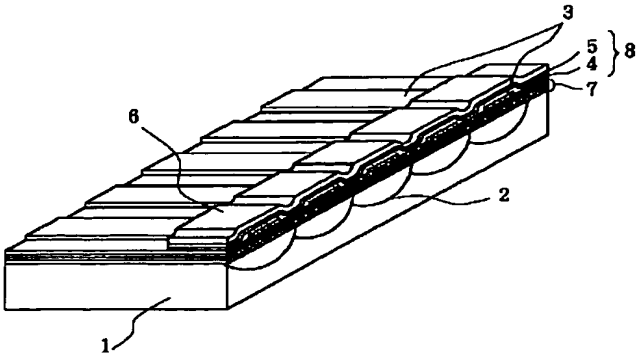
[0045] b) As shown in drawing 2 (b), form the translucent reflecting layer 7 which consists of two or more layers by the spatter on the field in which the micro lens 2 was formed.

[0046] c) As shown in drawing 2 (b), adjust line width of face and a pitch, put a metal mask, and form the anode plate layer 3 in predetermined thickness by the spatter so that the anode plate layer 3 may be in the portion corresponding to a micro lens 2.
[0047] d) As shown in drawing 2 (d), carry out the vacuum evaporationo of the electron hole transporting bed 4 and the electronic transporting bed 5 by the vacuum deposition method one by one.
[0048] e) As shown in drawing 2 (e), as it laps with the train of a micro lens 2, put the metal mask of desired line width of face on it, and form a catholyte 6.
[0049] The outline block diagram of image formation equipment using the electrophotography method as an example of the image formation equipment of this invention is shown in drawing 3 .
[0050] For an electrification means and 213, as for an imprint means and 215, a development means and 214 are [the electrophotography photo conductor of the rotating-drum type / 211 / as an image support, and 212 / a fixing means and 216] cleaning meanses.
[0051] The aligner (un-illustrating) of this invention is used as exposure L. If the driver for a drive is connected to an aligner, an anode plate layer is added, a catholyte is made minus and direct current voltage is impressed, green luminescence can be obtained from a light-emitting part, image formation can be carried out on a photo conductor 211, and a good picture can be acquired.
[0052] A photo conductor 211 top is uniformly charged by the electrification means 212. The exposure L by the aligner is made corresponding to the time series electrical-and-electric-equipment digital pixel signal of image information to be outputted to the electrification side of this photo conductor 211, and the electrostatic latent image corresponding to the target image information is formed to the peripheral surface of a photo conductor 211. The electrostatic latent image is developed as a toner image by the development means 213 which used the insulating toner. It is introduced into the pressure-welding nip section (imprint section) T of a photo conductor 211 and the contact imprint means made to contact this by the predetermined press force to predetermined timing, and imprints by supplying the imprint material p as record material from the feed section (un-illustrating), and on the other hand, impressing predetermined imprint bias voltage.
[0053] It dissociates from the field of a photo conductor 211, and the imprint material P which received the imprint of a toner picture is introduced to the fixing meanses 215, such as a heat fixing method, receives fixing of a toner picture, and is discharged out of equipment as an image formation object (print). Moreover, the photo conductor side after the toner picture imprint to the imprint material P is cleaned by the cleaning means 216 in response to removal of adhesion contaminations, such as a remains toner, and imaging is repeatedly presented with it.
[0054] The outline block diagram of multi-colored picture image formation equipment using the electrophotography method as other examples of the image formation equipment of this invention is shown in drawing 4 .
[0055] C1-C4 -- an electrification means, and D1-D4 -- for a development sleeve, and T1-T4, an imprint blade, and TR1-TR2 are [the exposure means of this invention, and S1-S4 / a development means, and E1-E4 / an imprint belt and P of a roller and TF1] a transfer paper and the electrophotography photo conductor of a rotating-drum type [304 / 301-304 / a fixing assembly, and
[0056] A transfer paper P is conveyed in the direction of an arrow, is drawn on the imprint belt TF 1 by which suspension was carried out to rollers TR1 and TR2, and moves to the black imprint position set up so that it might be pinched by a photo conductor 301 and the imprint blade T1 with the imprint belt TF 1. At this time, the photo conductor 301 has the toner picture of the black of a request by the electrophotography process by the development sleeve S1 of the electrification means C1 arranged on a drum periphery, the exposure means E1, and the development means D1, and the imprint of a black toner picture is performed to a transfer paper P.

[0057] The cyano imprint position set up so that a transfer paper P might be pinched by a photo conductor 302 and the imprint blade T2 with the imprint belt TF 1, It moves to the Magenta imprint position set up so that it might be pinched by a photo conductor 303 and the imprint blade T3, and the yellow imprint position set up so that it might be pinched by a photo conductor 304 and the imprint blade T4. in the imprint position of it that The imprint of a cyano toner picture, a Magenta toner picture, and a yellow toner picture is performed by the same means as a black imprint position.
[0058] Since each photo conductors 301-304 are performing good rotation at this time, between each record, registration of a picture can be performed good. The transfer paper P which performed multicolor record according to the above process can be established by the ability supplying a fixing assembly F1, and can obtain a desired multi-colored picture image.

[Translation done.]

Drawing selection [Representativ drawing]



[Translation done.]

JAPANESE [JP,2000-077188,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

EXAMPLE

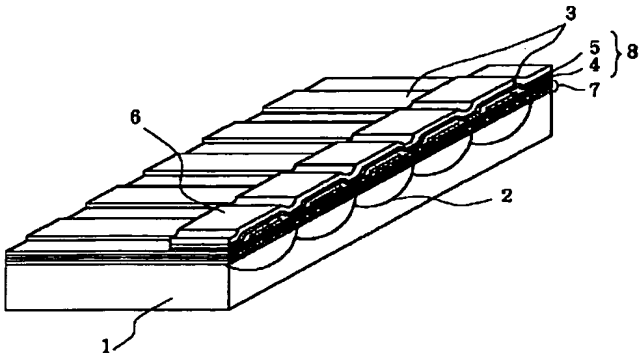
[Example] (Example 1) The light-emitting-device array shown in drawing 1 in the procedure shown in drawing 2 was produced.
[0060] The micro lens 2 is formed in the portion corresponding to each light-emitting part in the transparent insulating substrate 1 by the ion-exchange method, and the laminating of a dielectric layer 7, the anode plate layer 3, the electron hole transporting bed 4, the electronic transporting bed 5 that served both as the luminous layer, and the catholyte 6 is carried out on it.
[0061] First, the creation method of the micro lens 2 of a substrate 1 is explained.
[0062] In this example, the soda lime glass substrate was used as a transparent insulating substrate 1. Both sides of this glass substrate are fully washed.
[0063] Next, the mask of the whole glass substrate is carried out with Ti film. A main interval forms in Ti of an ionic diffusion side the opening train which is 80 micrometers for the diameter of 30 micrometers by the FOTORISO etching method.
[0064] This substrate is dipped in the mixed fused salt of TINO3 and KNO3, in order to perform the ion exchange, and the semi-sphere-like refractive-index field (micro lens) 2 whose diameter is about 70 micrometers is formed.
[0065] Next, the creation method of a light-emitting-device array is explained.
[0066] the field top in which the micro lens 2 was formed -- a spatter -- the SiO two-layer of 93nm of thickness -- 21 and the TiO two-layer of 59nm of thickness -- the laminating of 22 is carried out by turns, and the translucent reflecting layer 2 is formed
[0067] Next, ITO is formed as an anode plate layer 3. Line width of face of 50 micrometers and a pitch 80micrometer metal mask are put, and 60nm of ITO(s) is formed by the spatter so that ITO may be in the portion corresponding to a micro lens 2.
[0068] Next, 50nm vacuum evaporationo of the 40nm of Alq(s)3 is carried out for TPD by the vacuum deposition method one by one as an electronic transporting bed 5 as an electron hole transporting bed 4, respectively. In addition, the degree of vacuum at the time of vacuum evaporationo is 2 - 3x10-6Torr, and membrane formation speed was carried out innm [0.2-0.3 //s].
[0069] It intersects perpendicularly with the anode plate layer 2, finally, a metal mask with a line width of face of 40 micrometers is put on it, as it laps with the train of a micro lens 2, vapor codeposition is carried out to Ag by the evaporation-rate ratio of Mg and10:1 as a catholyte 6, and Mg/Ag forms 200nm of 10/1 of alloys. Membrane formation speed was made into 1 nm/s at this time.
[0070] The effective-area product of a micro lens 2 is made larger than the area of a light-emitting part, and it is made to obtain efficiently the light which emitted light.
[0071] Thus, when the Mg/Ag electrode which are plus and a catholyte about the ITO electrode which is an anode plate layer was made minus and direct current voltage was impressed to the obtained light-emitting-device array, green luminescence was obtained from the portion which

the ITO electrode and the Mg/Ag electrode intersect.
[0072] The driver for a drive was connected to the light-emitting-device array (example of comparison) which changed thickness, such as this light-emitting-device array, and a translucent reflecting layer, an organic compound layer, it wrote in the photo conductor as the light source for electrophotography, and the picture was actually outputted. The sensitivity property of a photo conductor and the emission spectrum of a light-emitting-device array are shown in drawing 5 .
[0073] As shown in drawing 5 , the light-emitting-device array of an example 1 has an emission peak wavelength within the half-value width of the sensitivity of a photo conductor, and was able to acquire the good picture. On the other hand, since there was no luminescence peak within the half-value width of the sensitivity of a photo conductor, it could not lower to the potential of a request of the potential of a photo conductor, but the picture faded, and the light-emitting-device array of the example of comparison was not able to acquire a good picture.
[0074] Furthermore, when some kinds of light-emitting-device arrays from which an emission peak wavelength differs are produced and a picture output is performed, in order to acquire a good picture, it was required to have an emission peak wavelength within the half-value width of the sensitivity of a photo conductor at least. Although a good picture can be acquired by making driver voltage high even if it does not have an emission peak wavelength within the half-value width of the sensitivity of a photo conductor, the problem that an element life becomes short in this case generates and is not desirable.
[0075] Thus, while diffusion of light was suppressed and the breadth of an exposure spot was lessened by using the light-emitting-device array which has a micro lens and optical-resonator structure, it became possible to carry out image formation on a photo conductor by the micro lens. Moreover, since the output of peak wavelength was strengthened while narrowing half-value width of luminescence wavelength, it became possible to use the luminescence quantity of light efficiently.
[0076] In this example, although the light-emitting-device array of 300dpi was created, it is changing electrode width of face, and it is possible to acquire the point of arbitrary sizes emitting light.
[0077] (Example 2) Drawing 6 is the cross section of the light-emitting-device array of this example.
[0078] The micro lens 24 which has a convex lens configuration is formed in the portion corresponding to each light-emitting part at the glass substrate carried out substrate 1, and the laminating of the translucent reflecting layer 7, the anode plate layer 3, the electron hole transporting bed 4, the electronic transporting bed 5 that served both as the luminous layer, and the catholyte 6 is carried out on it.
[0079] First, the creation method of the micro lens 24 on a glass substrate is explained.
[0080] Since there are ultraviolet [usual] and a photoresist for far-ultraviolet as a material for forming a lens, especially photoresists for positive-type far-ultraviolet, such as a polymethylmethacrylate system, a PMIPK system, the poly glycyl methyl acrylate system, and a phenol novolak system, soften at low temperature comparatively and it is easy to form a condenser lens configuration, it is desirable.
[0081] The laminating of the photoresist which was described above on the glass substrate is carried out by methods, such as an application, and patterning of the photoresist layer is carried out using pattern formation methods, such as the lift-off method and the dry etching method, so that a main interval may be set to 80 micrometers for the diameter of 70 micrometers by the FOTORISO method. This photoresist by which patterning was carried out is made to soften and fluidize with annealing, and the circular micro lens 24 is formed.
[0082] Next, after forming the translucent reflecting layer 7 like an example 1, line width of face of 50 micrometers and a pitch 80micrometer metal mask are put, and 60nm of ITO(s) is formed

by the spatter as an anode plate layer 3 so that it may correspond to a micro lens 24.
[0083] Next, the vacuum evaporationo of Alq3 is carried out for TPD by the vacuum deposition method one by one as an electronic transporting bed 5 as an electron hole transporting bed 4 like an example 1. In addition, the degree of vacuum at the time of vacuum evaporationo is two to 3x10-6, and membrane formation speed was carried out innm [0.2-0.3 //s].
[0084] Finally, a metal mask with a line width of face of 40 micrometers is put on it, as it laps with the train of a micro lens 24, vapor codeposition of Ag is carried out by the evaporation-rate ratio of Mg and10:1 as a catholyte 6, and Mg/Ag forms 200nm of 10/1 of alloys. Membrane formation speed was made into 1 nm/s at this time.
[0085] Thus, the driver for a drive was connected to the obtained light-emitting-device array, and it used as the light source for electrophotography. Like the example 1, green luminescence was able to be obtained from the crossing portion, image formation of an ITO electrode and the Mg/Ag electrode was able to be carried out on the photoconductor drum side through the translucent reflecting layer 7 and the micro lens 24, and the good picture was able to be acquired.
[0086] Thus, it became realizable [the optical printer head from which a high definition picture is acquired with low power] by giving optical-resonator structure to a light-emitting-device array.
[0087] (Example 3) The organic LED array shown in drawing 7 in the procedure shown in drawing 8 was produced.
[0088] On the glass substrate as a substrate 1, the micro lens 25 which has a convex lens configuration into the portion corresponding to each light-emitting part is formed, and the laminating of the electronic transporting bed 5 which served both as the translucent reflecting layer 7, the anode plate layer 3, the electron hole transporting bed 4, and the luminous layer to the field of a micro lens 25 and an opposite side to the substrate 1, and the catholyte 6 is carried out.
[0089] First, the creation method of the micro lens 25 on a glass substrate is explained. As shown in drawing 8 (a), a micro lens 25 forms the array 75 micrometers and whose main interval the diameter of opening is 80 micrometers by the replica method. And the translucent reflecting layer 7 is formed in the field of a micro lens 25 and an opposite side like an example 1.
[0090] As shown in drawing 8 (b), line width of face of 50 micrometers and a pitch 80micrometer metal mask are put on the field in which the micro lens 25 was formed, and the field of an opposite side, and 60nm of ITO(s) is formed in them by the spatter as an anode plate layer 3 so that it may correspond to a micro lens 25.
[0091] Next, as shown in drawing 8 (c), the vacuum evaporationo of Alq3 is carried out for TPD by the vacuum deposition method one by one as an electronic transporting bed 5 as an electron hole transporting bed 4 like an example 1.
[0092] Finally, as shown in drawing 8 (d), a metal mask with a line width of face of 40 micrometers is put on it, as it laps with the train of a micro lens 25, vapor codeposition of Ag is carried out by the evaporation-rate ratio of Mg and10:1 as a catholyte 6, and Mg/Ag forms 200nm of 10/1 of alloys.
[0093] Thus, the driver for a drive was able to be connected to the obtained organic LED array, and the good picture was able to obtain by using as the light source for electrophotography.

[Translation done.]

Drawing selection [Representativ drawing]



[Translation done.]

JAPANESE [JP,2000-077188,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

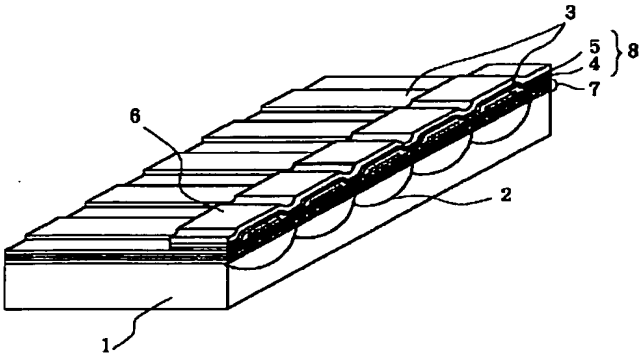
[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective diagram showing an example of the light-emitting-device array of this invention.
[Drawing 2] It is drawing showing an example of the production process of the light-emitting-device array of this invention.
[Drawing 3] It is the outline block diagram showing an example of the image formation equipment of this invention.
[Drawing 4] It is the outline block diagram showing other examples of the image formation equipment of this invention.
[Drawing 5] It is the graph which shows the spectral sensitivity of the photo conductor of an example 1, and the relation of the luminescence wavelength of a light-emitting-device array.
[Drawing 6] It is the cross section showing the light-emitting-device array in an example 2.
[Drawing 7] It is the cross section showing the light-emitting-device array in an example 3.
[Drawing 8] It is drawing showing the production process of the light-emitting-device array in an example 3.
[Description of Notations]
1 Substrate
2, 24, 25 Micro lens
3 Anode Plate Layer
4 Electron Hole Transporting Bed
5 Electronic Transporting Bed
6 Catholyte
7 Translucent Reflecting Layer
8 Organic Compound Layer
71 SiO Two-layer
72 TiO Two-layer

[Translation done.]

Drawing selection [Representativ drawing]



[Translation done.]

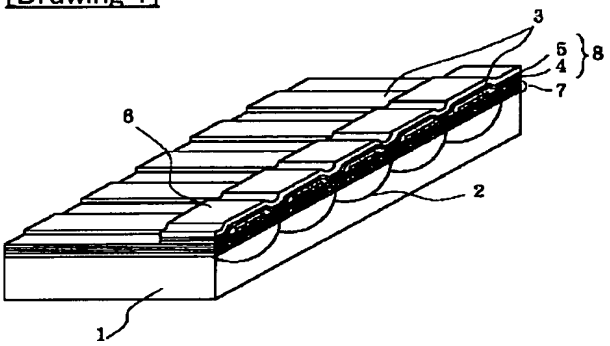
JAPANESE [JP,2000-077188,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

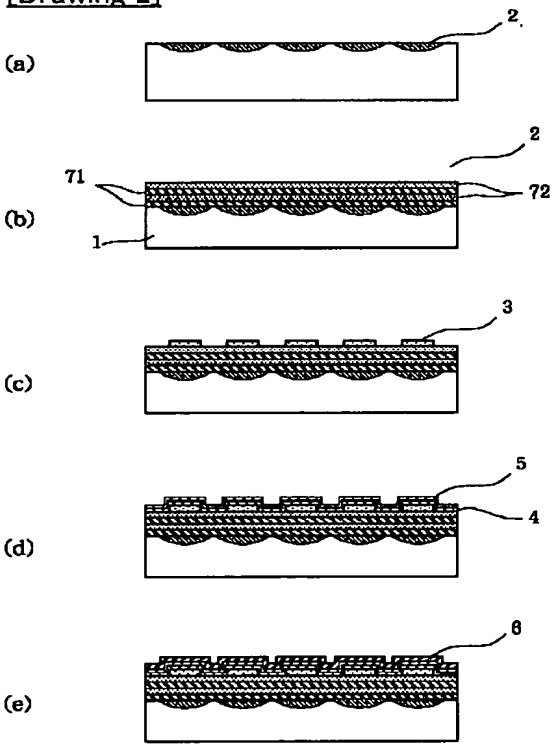
[Translation done.]

DRAWINGS

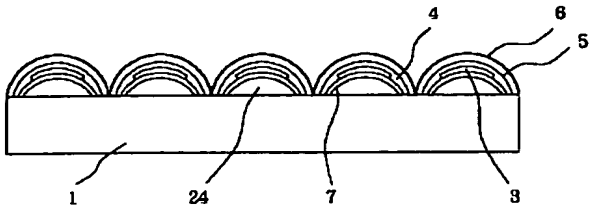
[Drawing 1]



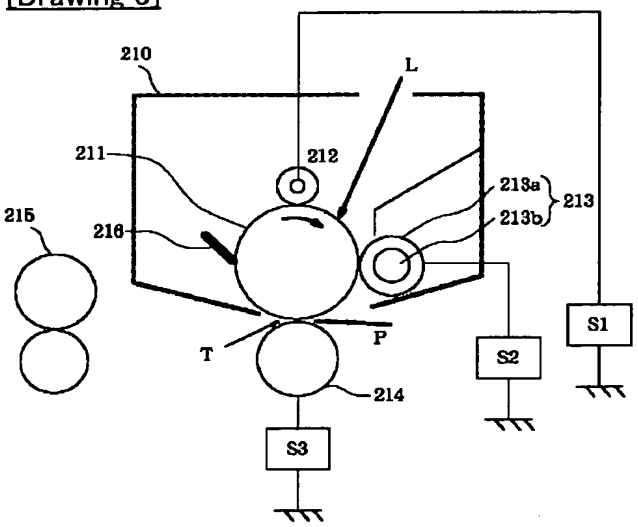
[Drawing 2]



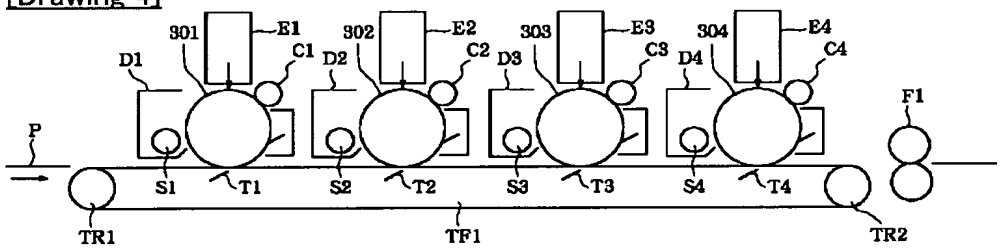
[Drawing 6]



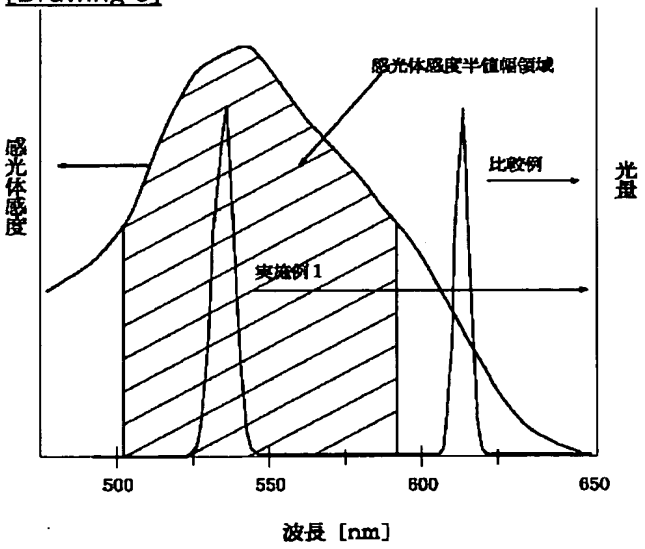
[Drawing 3]



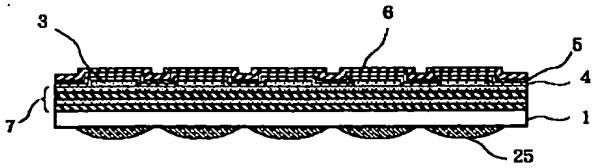
[Drawing 4]



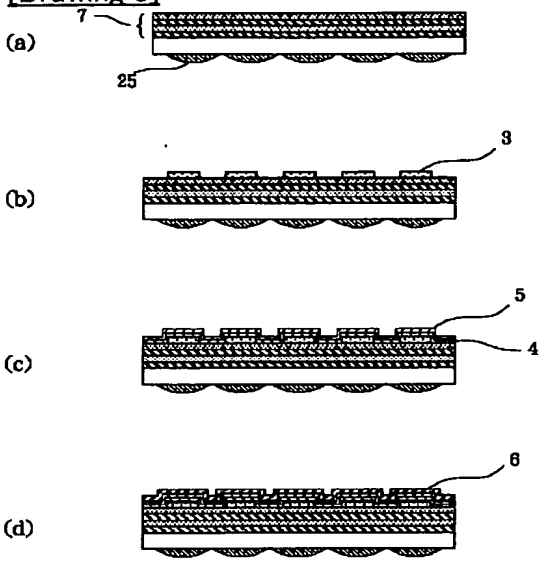
[Drawing 5]



[Drawing 7]

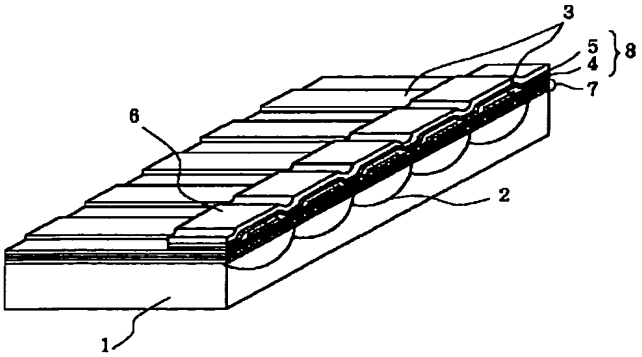


[Drawing 8]



[Translation done.]

Drawing selection [Representativ drawing]



[Translation done.]

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特開2000－77188
（Ｐ2000－77188Ａ）
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(51)Int.Cl.'	識別記号	ＦＩ		テーマコード'（参考）
Ｈ０５Ｂ　33/22		Ｈ０５Ｂ　33/22	Ｚ	
Ｂ４１Ｊ　2/44		Ｇ０３Ｂ　27/32	Ｚ	
2/45		Ｈ０５Ｂ　33/14	Ａ	
2/455		33/24		
Ｇ０３Ｂ　27/32		Ｂ４１Ｊ　3/21	Ｌ	

審査請求　未請求　請求項の数10　ＯＬ　（全 14 頁）　最終頁に続く

(21)出願番号　顔平10－244948

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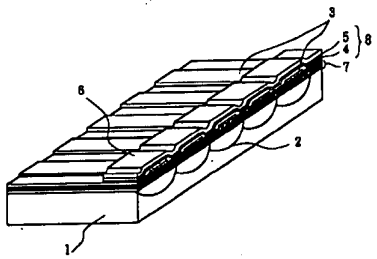
最終頁に続く

(54)【発明の名称】　露光装置及び画像形成装置

(57)【要約】
【課題】　高速、小型、低コスト、高精細であると同時に発光素子の発光した光量を効率よく利用可能な感光材料書込み装置を提供する。
【解決手段】　基板１上に、少なくとも陽極層３及び陰極層６と、これらの間に挟持された一層または複数層の有機化合物層８より構成される発光素子アレイを有する露光装置であって、該発光素子アレイが、基板１にマイクロレンズ２を有しており、更に半透明反射層７を有して該半透明反射層７と陰極層６間で微小光共振器構造を形成し、かつ、該露光装置により露光される感光体の波長に対する感度の半値幅域内に発光ピークを有する露光装置。



【特許請求の範囲】
【請求項１】　基板上に、少なくとも陽極層及び陰極層と、これらの間に挟持された一層または複数層の有機化合物層より構成される発光素子アレイを有する露光装置であって、該発光素子アレイが、基板にマイクロレンズを有しており、更に半透明反射層を有して該半透明反射層と陰極層間で微小光共振器構造を形成しており、かつ、該露光装置により露光される感光体の波長に対する感度の半値幅域内に発光ピークを有することを特徴とする露光装置。
【請求項２】　マイクロレンズが、発光部と１対１対応であることを特徴とする請求項１に記載の露光装置。
【請求項３】　マイクロレンズの開口部面積が、発光部の面積より大きいことを特徴とする請求項１または２に記載の露光装置。
【請求項４】　マイクロレンズの焦点距離が、発光部とその発光部に対応するマイクロレンズ間の距離よりも短いことを特徴とする請求項１～３に記載の露光装置。
【請求項５】　マイクロレンズが、発光部に対応する部分の基板をイオン交換することにより形成されることを特徴とする請求項１～４に記載の露光装置。
【請求項６】　マイクロレンズが、発光部に対して凸レンズ形状を有するマイクロレンズであることを特徴とする請求項１～５に記載の露光装置。
【請求項７】　マイクロレンズが、基板の有機化合物層が形成される側と同一側の面に形成されていることを特徴とする請求項１～６に記載の露光装置。
【請求項８】　マイクロレンズが、基板の有機化合物層が形成される側と反対側の面に形成されていることを特徴とする請求項１～７に記載の露光装置。
【請求項９】　半透明反射層が陽極層と接していることを特徴とする請求項１～８に記載の露光装置。
【請求項１０】　請求項１～９に記載の露光装置と、該露光装置により露光される感光体とを少なくとも有することを特徴とする画像形成装置。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は複写機、プリンタ等の電子写真装置に用いる露光装置及び画像形成装置、特に光プリンタヘッドに関するものである。
【０００２】
【従来の技術】従来より、感光体上に潜像を書き込むための露光方式としてレーザービーム方式、ＬＥＤアレイ方式などが中心となっている。
【０００３】しかしながら、レーザービーム方式の場合、ポリゴンミラーやレンズ等の光学部品が必要となり装置の小型化が難しく、また超高速化も難しいという問題がある。
【０００４】また、ＬＥＤアレイ方式の場合は、基板が高価であり、一枚の基板でアレイをつくれないため、切り出したチップを並べる必要がある。そのときにチップ間の段差、間隔が問題となる。
【０００５】また、感光体上に結像するためにロッドレンズアレイが必要であるが、拡散光をロッドレンズアレイで結像しようとした場合、ロッドレンズアレイの光入射効率が低く、発光素子の発光した光を効率よく利用することができない。従って、感光体上で必要な光量を得るためには、発光素子を必要以上に発光させなくてはならなかった。
【０００６】更に、通常の有機発光素子の発光波長は半値幅が１００ｎｍ程度と広いため、感光体の感度ピークと合わない光量成分もあり効率的ではなかった。
【０００７】
【発明が解決しようとする課題】本発明は、上記従来の問題を解決し、高速、小型、低コスト、高精細であると同時に発光素子の発光した光量を効率よく利用可能な露光装置及び画像形成装置、特に光プリンタヘッドを提供することを目的とする。
【０００８】
【課題を解決するための手段】本発明の露光装置は、基板上に、少なくとも陽極層及び陰極層と、これらの間に挟持された一層または複数層の有機化合物層より構成される発光素子アレイを有する露光装置であって、該発光素子アレイが、基板にマイクロレンズを有しており、更に半透明反射層を有して該半透明反射層と陰極層間で微小光共振器構造を形成しており、かつ、該露光装置により露光される感光体の波長に対する感度の半値幅域内に発光ピークを有することを特徴とする。
【０００９】更に、本発明の画像形成装置は、上記露光装置と、該露光装置により露光される感光体とを少なくとも有することを特徴とする。
【００１０】このような構成をとることにより、高速、小型、低コスト、高精細であると同時に発光した光を効率よく利用できる露光装置、具体的には光プリンタヘッド等を提供することが可能である。
【００１１】
【発明の実施の形態】以下、本発明を図面を用いて詳細に説明する。
【００１２】図１は本発明の露光装置である発光素子アレイの一例を示す斜視図である。
【００１３】図１において、１は基板、２はマイクロレンズ、３は透明電極である陽極層、６は陰極層、７は半透明反射層、８は正孔輸送層４及び電子輸送層５より構成される有機化合物層であり、陽極層３と陰極層６間に電圧を印加することにより、陽極層３と陰極層６が交差している部分（発光部）から発光が得られ、陽極層３又は陰極層６の電極幅を変更することで、任意の大きさの発光部を得ることが可能である。
【００１４】本発明において、基板１はマイクロレンズ２を有する。図１に示すように、マイクロレンズ２は、

発光部と１対１対応に形成されている。

【００１５】この際、発光した光を効率よく利用するためには、マイクロレンズ２の開口部面積が発光部の面積よりも大きい方が好ましい。また、光盘を効率的に得るためには、マイクロレンズ２の焦点距離が、発光部とその発光部に対応するマイクロレンズ２間の距離よりも短い方が好ましい。

【００１６】マイクロレンズ２は図１に示すものに限定されるものではなく、発光部からの発光を集光できるものであればよい。具体的には、図１においては、マイクロレンズ２が、発光部に対して凸レンズ形状を有するマイクロレンズであるが、凹レンズ形状を有するマイクロレンズとしてもよい。また、図１においては、マイクロレンズ２が、基板１の有機化合物層８が形成される側と同一側の面に形成されているが、マイクロレンズ２を、基板１の有機化合物層８が形成される側と反対側の面に形成してもよい。

【００１７】また、発光素子アレイは、半透明反射層７と陰極層６間で微小光共振器構造を形成している。このため、光の拡散が抑えられ、露光スポットの広がりを少なくすることが可能となる。また、発光波長の半値幅を狭くすると同時にピーク波長の出力を強めることができるので、発光光盘を効率よく利用することが可能となる。

【００１８】更に、発光素子アレイは、露光される感光体の波長に対する感度の半値幅域内に発光ピークを有する。このため、良好な画像を得られ、駆動電圧を低くすることができ、素子寿命を長くできる。

【００１９】基板１としては、発光素子、マイクロレンズを表面に構成できるものであればよく、例えばソーダライムガラス等のガラス、樹脂フィルム等の透明絶縁性基板を用いるのが好ましい。

【００２０】半透明反射層７としては、特定の波長の反射透過率を高くまたは低くすることができる構成であれば特に限定されず、例えば、材質、厚み等により屈折率が異なる複数の層を積層したものが好ましい。半透明反射層７を形成する材料としては、例えば、SiO_2、TiO_2等が挙げられる。

【００２１】陽極層３の材料としては仕事関数が大きなものが望ましく、例えばＩＴＯ、酸化錫、金、白金、パラジウム、セレン、イリジウム、ヨウ化銅などを用いることができる。一方、陰極層６の材料としては仕事関数が小さなものが望ましく、例えばＭｇ／Ａｇ、Ｍｇ、Ａｌ、Ｌｉ、Ｉｎあるいはこれらの合金等を用いることができる。

【００２２】有機化合物層８は、一層構成であっても良いし、複数層構成であっても良く、例えば図１に示すように、陽極層３から正孔が注入される正孔輸送層４、及び陰極層６から電子が注入される電子輸送層５からなり、正孔輸送層４と電子輸送層５のいずれかが発光層となる。また、蛍光材料を含有する発光層を正孔輸送層４と電子輸送層５との間に設けても良い。また、混合一層構成で正孔輸送層４，電子輸送層５，発光層を兼ねた構成も可能である。

【００２３】有機化合物層８の材料は、使用する感光ドラム等の感光材料と感度のあったスペクトル発光をするものを選択することが望ましい。

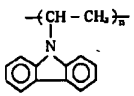
【００２４】正孔輸送層４としては、例えば、Ｎ，Ｎ’－ビス（３－メチルフェニル）－Ｎ，Ｎ’－ジフェニル－（１，１’－ビフェニル）－４，４’－ジアミン（以下ＴＰＤ）を用いることができ、その他にも下記の有機材料を用いることができる。

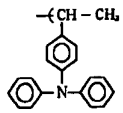
【００２５】

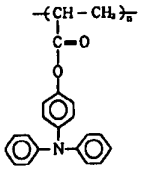
【化１】

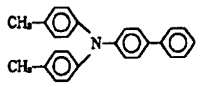
ホール輸送性化合物

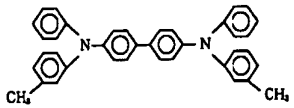
ホール輸送体

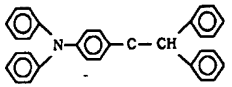








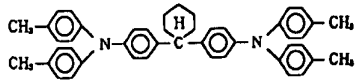


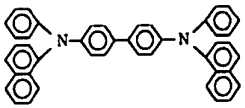


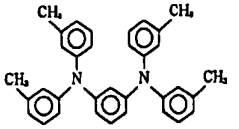
【００２６】

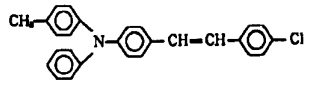
【化２】

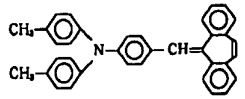
ホール輸送性化合物







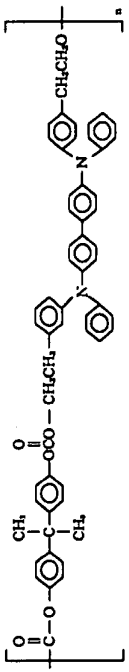




【００２７】

【化３】

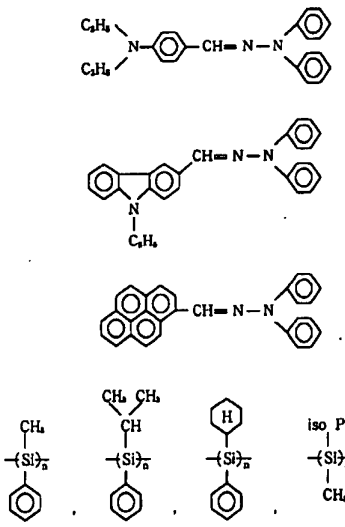
ホール輸送性化合物



【００２８】

【化４】

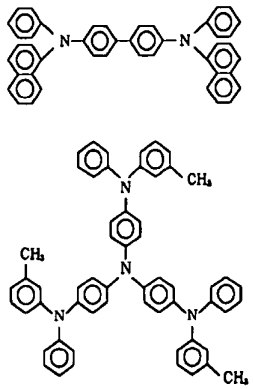
ホール輸送性化合物



【００２９】

【化５】

ホール輸送性化合物



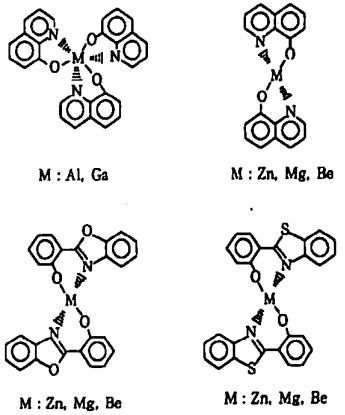
【００３０】また、例えばａ－Ｓｉ、ａ－ＳｉＣなどの無機材料を用いてもよい。

【００３１】電子輸送層５としては、例えば、トリス（８－キノリノール）アルミニウム（以下Ａｌｑ３）を用いることができ、その他にも下記の材料を用いることができる。

【００３２】

【化６】

電子輸送性化合物



【００３３】

【化７】

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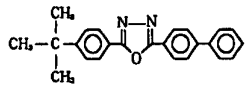
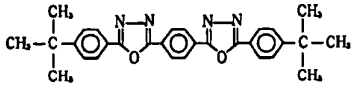
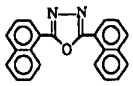
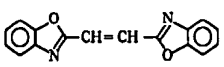
電子輸送性化合物





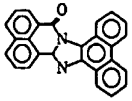


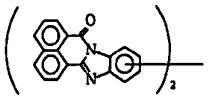


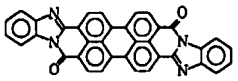
【００３４】

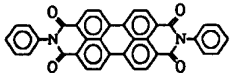
【化８】

電子輸送性化合物









【００３５】

【化９】

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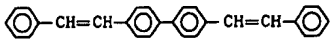
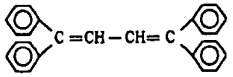
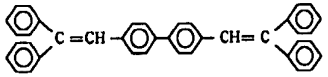
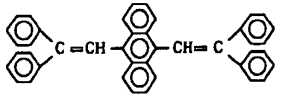
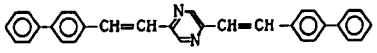
電子輸送性化合物

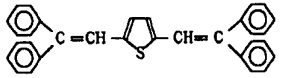












【００３６】また、以下に示されているようなドーパント色素を電子輸送層５、あるいは正孔輸送層４にドーピングすることもできる。

【００３７】

【化１０】

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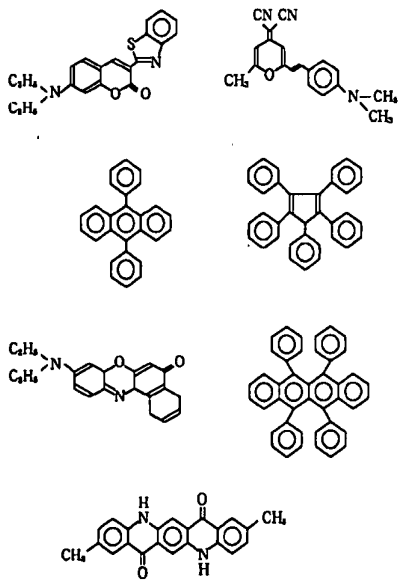
ドーパンド色素



【００３８】各層の膜厚等は、特に限定されないが、感光体と感度の合ったスペクトルを取り出せるように最適化することが望ましい。

【００３９】尚、逆の積層順、即ち基板上に陰極層、有機化合物層、陽極層、半透明反射層を順次積層し、最後にマイクロレンズを形成して発光素子アレイを構成してもよい。

【００４０】以下、本発明の発光素子アレイの作製工程の一例を図２に沿って説明する。

【００４１】ａ）マイクロレンズ２の作製（図２（ａ））

マイクロレンズ２は、発光部に対応する部分の基板１をイオン交換することにより形成することができる。

【００４２】まず、基板１の両面を十分に洗浄する。次に、基板１全体をＴｉなどのイオン非透過性の膜によってマスクする。イオン拡散面のＴｉにフォトリソエッチング法により所望の直径、中心間隔で開口部列を形成する。この基板をイオン交換処理を行うため、例えばＴｌNO_3とＫNO_3の混合溶融塩、Ag^+、Tl^+などの硝酸塩、硫酸塩などの溶融塩に没し、半球状のマイクロレンズ２を形成する。

【００４３】この際、マイクロレンズ２の屈折率分布を何段階かに分けて形成しても良い。

【００４４】また、マイクロレンズ２の形成方法は特に限定されず、後述する実施例に示すように、フォトレジストを用いる方法、レプリカ法等により形成してもよい。

【００４５】ｂ）図２（ｂ）に示すように、マイクロレンズ２の形成された面上にスパッタ法により、複数層よりなる半透明反射層７を形成する。

【００４６】ｃ）図２（ｂ）に示すように、マイクロレンズ２に対応する部分に陽極層３がのるように、ライン幅、ピッチを調整して金属マスクを被せて、スパッタ法により所定の厚さに陽極層３を形成する。

【００４７】ｄ）図２（ｄ）に示すように、正孔輸送層４、電子輸送層５を順次真空蒸着法により蒸着する。

【００４８】ｅ）図２（ｅ）に示すように、所望のライン幅の金属マスクをマイクロレンズ２の列に直なるようにして被せ、陰極層６を形成する。

【００４９】本発明の画像形成装置の一例として、電子写真方式を用いた画像形成装置の概略構成図を図３に示す。

【００５０】２１１は像担持体としての回転ドラム型の電子写真感光体、２１２は帯電手段、２１３は現像手段、２１４は転写手段、２１５は定着手段、２１６はクリーニング手段である。

【００５１】露光Ｌとしては、本発明の露光装置（不図示）を用いる。露光装置には駆動用ドライバが接続され、陽極層をプラス、陰極層をマイナスにして直流電圧を印加すると、発光部から緑色の発光が得られ、感光体

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２１１上に結像させることができ、良好な画像を得ることができる。

【００５２】感光体２１１上を帯電手段２１２により一様に帯電する。この感光体２１１の帯電面に対して出力される目的の画像情報の時系列電気デジタル画素信号に対応して露光装置による露光Ｌがなされ、感光体２１１の周面に対して目的の画像情報に対応した静電潜像が形成される。その静電潜像は絶縁トナーを用いた現像手段２１３によりトナー像として現像される。一方、給紙部（不図示）から記録材としての転写材ｐが供給されて、感光体２１１と、これに所定の押圧力で当接させた接触転写手段との圧接ニップ部（転写部）Ｔに所定のタイミングにて導入され、所定の転写バイアス電圧を印加して転写を行う。

【００５３】トナー画像の転写をうけた転写材Ｐは感光体２１１の面から分離されて熱定着方式等の定着手段２１５へ導入されてトナー画像の定着をうけ、画像形成物（プリント）として装置外へ排出される。また転写材Ｐに対するトナー画像転写後の感光体面はクリーニング手段２１６により残留トナー等の付着汚染物の除去をうけて清掃され繰り返して作像に供される。

【００５４】本発明の画像形成装置の他の例として、電子写真方式を用いた多色画像形成装置の概略構成図を図４に示す。

【００５５】Ｃ１～Ｃ４は帯電手段、Ｄ１～Ｄ４は現像手段、Ｅ１～Ｅ４は本発明の露光手段、Ｓ１～Ｓ４は現像スリーブ、Ｔ１～Ｔ４は転写ブレード、ＴＲ１～ＴＲ２はローラ、ＴＦ１は転写ベルト、Ｐは転写紙、Ｆ１は定着器、３０１～３０４は回転ドラム型の電子写真感光体である。

【００５６】転写紙Ｐは矢印方向に搬送され、ローラＴＲ１、ＴＲ２に懸架された転写ベルトＴＦ１上に導かれ、転写ベルトＴＦ１により感光体３０１と転写ブレードＴ１に挟持されるように設定されたブラック転写位置へと移動する。この時、感光体３０１はドラム周上に配置された、帯電手段Ｃ１、露光手段Ｅ１、現像手段Ｄ１の現像スリーブＳ１により電子写真プロセスにより所望のブラックのトナー画像を有していて、転写紙Ｐにブラックトナー画像の転写が行われる。

【００５７】転写紙Ｐは転写ベルトＴＦ１により、感光体３０２と転写ブレードＴ２に挟持されるように設定されたシアン転写位置、感光体３０３と転写ブレードＴ３に挟持されるように設定されたマゼンタ転写位置、感光体３０４と転写ブレードＴ４に挟持されるように設定されたイエロー転写位置へと移動し、それぞれの転写位置で、ブラック転写位置と同様の手段により、シアントナー画像、マゼンタトナー画像、イエロートナー画像の転写が行われる。

【００５８】この時、各感光体３０１～３０４が良好な回転を行っているので、各記録間では、画像のレジストレーションが良好に行える。以上のプロセスにより多色記録を行った転写紙Ｐは定着器Ｆ１に供給され定着を行い所望の多色画像を得ることができる。

【００５９】

【実施例】（実施例１）図２に示す手順で図１に示す発光素子アレイを作製した。

【００６０】透明絶縁性の基板１は各発光部に対応した部分にイオン交換法によりマイクロレンズ２が形成されており、その上には誘電層７、陽極層３、正孔輸送層４、発光層を兼ねた電子輸送層５、そして陰極層６が積層されている。

【００６１】まず、基板１のマイクロレンズ２の作成方法について説明する。

【００６２】本実施例では、透明絶縁性の基板１としてソーダライムガラス基板を用いた。このガラス基板の両面を十分に洗浄する。

【００６３】次に、ガラス基板全体をＴｉ膜によってマスクする。イオン拡散面のＴｉにフォトリソエッチング法により直径３０μｍで中心間隔が８０μｍの開口部列を形成する。

【００６４】この基板をイオン交換を行うためＴｌNO_3とＫNO_3の混合溶融塩に没し、直径がほぼ７０μｍの半球状の屈折率領域（マイクロレンズ）２を形成する。

【００６５】次に、発光素子アレイの作成方法について説明する。

【００６６】マイクロレンズ２の形成された面上にスパッタ法により、層厚９３ｎｍのＳｉO_2層２１及び層厚５９ｎｍのＴｉO_2層２２を交互に積層し、半透明反射層２を形成する。

【００６７】次に陽極層３としてＩＴＯを形成する。マイクロレンズ２に対応する部分にＩＴＯがのるように、ライン幅５０μｍ、ピッチ８０μｍの金属マスクを被せてＩＴＯをスパッタ法により６０ｎｍ形成する。

【００６８】次に、正孔輸送層４としてＴＰＤを、電子輸送層５としてAlq_3を順次真空蒸着法によりそれぞれ４０ｎｍ、５０ｎｍ蒸着する。なお、蒸着時の真空度は２～３×10^{-6}Ｔｏｒｒであり、成膜速度は０．２～０．３ｎｍ／ｓとした。

【００６９】最後に、ライン幅４０μｍの金属マスクを陽極層２と直交し、マイクロレンズ２の列に直なるようにして被せ、陰極層６としてＭｇとＡｇと１０：１の蒸着速度比で共蒸着し、Ｍｇ／Ａｇが１０／１の合金を２００ｎｍ形成する。このとき、成膜速度は１ｎｍ／ｓとした。

【００７０】マイクロレンズ２の開口面積は発光部の面積よりも大きくし、発光した光を効率よく得るようにしている。

【００７１】このようにして得られた発光素子アレイに、陽極層であるＩＴＯ電極をプラス、陰極層であるＭｇ／Ａｇ電極をマイナスにして直流電圧を印加すると、

ＩＴＯ電極とＭｇ／Ａｇ電極が交差している部分から緑色の発光が得られた。

【００７２】この発光素子アレイ、及び半透明反射層・有機化合物層等の厚みをかえた発光素子アレイ（比較例）に駆動用ドライバを接続し、電子写真用の光源として感光体に書込みを行い、実際に画像を出力した。図５に、感光体の感度特性と発光素子アレイの発光スペクトルを示す。

【００７３】図５に示すように、実施例１の発光素子アレイは、感光体の感度の半値幅域内に発光ピーク波長を有し、良好な画像を得ることができた。一方、比較例の発光素子アレイは、発光ピークが感光体の感度の半値幅域内にはないため、感光体の電位を所望の電位まで下げることができず、画像がぼけてしまい良好な画像を得ることができなかった。

【００７４】更に、発光ピーク波長の異なる数種類の発光素子アレイを作製し、画像出力を行ったところ、良好な画像を得るためには、少なくとも感光体の感度の半値幅域内に発光ピーク波長を有することが必要であった。感光体の感度の半値幅域内に発光ピーク波長を有さなくても駆動電圧を高くすることで良好な画像を得られるようになるが、この場合には素子寿命が短くなるという問題が生じて好ましくない。

【００７５】この様にマイクロレンズ及び光共振器構造を有する発光素子アレイを用いることで、光の拡散が抑えられ、露光スポットの広がりを少なくすると同時にマイクロレンズにより感光体上に結像することが可能となった。また、発光波長の半値幅を狭くすると同時にピーク波長の出力を強めることができるので、発光光量を効率よく利用することが可能となった。

【００７６】本実施例においては、３００ｄｐｉの発光素子アレイを作成したが、電極幅を変更することで、任意の大きさの発光点を得ることが可能である。

【００７７】（実施例２）図６は本実施例の発光素子アレイの断面図である。

【００７８】基板１してのガラス基板には各発光部に対応した部分に凸レンズ形状を有するマイクロレンズ２４が形成されており、その上には半透明反射層７、陽極層３、正孔輸送層４、発光層を兼ねた電子輸送層５、そして陰極層６が積層されている。

【００７９】まず、ガラス基板上のマイクロレンズ２４の作成方法について説明する。

【００８０】レンズを形成するための材料としては、通常の紫外、遠紫外用フォトレジストがあり、特にポリメチルメタクリレート系、ＰＭＩＰＫ系、ポリグリシルメチルアクリレート系、フェノールノボラック系等のポジ型遠紫外用フォトレジストが、比較的低温で軟化して、集光レンズ形状を形成し易いので望ましい。

【００８１】ガラス基板上に上記したようなフォトレジストを塗布等の方法により積層し、フォトリソ法により

直径７０μｍで中心間隔が８０μｍになるように、フォトレジスト層をリフトオフ法やドライエッチング法等のパターン形成法を用いてパターニングする。このパターニングされたフォトレジストをアニーリングによって、軟化、流動化させ、円弧状のマイクロレンズ２４を形成する。

【００８２】次に、実施例１と同様にして半透明反射層７を形成した後、マイクロレンズ２４に対応するように、ライン幅５０μｍ、ピッチ８０μｍの金属マスクを被せて陽極層３としてＩＴＯをスパッタ法により６０ｎｍ形成する。

【００８３】次に、実施例１と同様に正孔輸送層４としてＴＰＤを、電子輸送層５としてAlq_3を順次真空蒸着法により蒸着する。なお、蒸着時の真空度は２～３×10^{-6}であり、成膜速度は０．２～０．３ｎｍ／ｓとした。

【００８４】最後に、ライン幅４０μｍの金属マスクをマイクロレンズ２４の列に直なるようにして被せ、陰極層６としてＭｇとＡｇを１０：１の蒸着速度比で共蒸着し、Ｍｇ／Ａｇが１０／１の合金を２００ｎｍ形成する。このとき、成膜速度は１ｎｍ／ｓとした。

【００８５】このようにして得られた発光素子アレイに駆動用ドライバを接続し、電子写真用の光源として用いた。実施例１と同様にＩＴＯ電極とＭｇ／Ａｇ電極を交差している部分から緑色の発光が得られ、半透明反射層７、マイクロレンズ２４を通して感光ドラム面上に結像させることができ、良好な画像を得ることができた。

【００８６】この様に、発光素子アレイに光共振器構造を持たせることにより、低電力で高精細な画像が得られる光プリンタヘッドの実現が可能となった。

【００８７】（実施例３）図８に示す手順で図７に示す有機ＬＥＤアレイを作製した。

【００８８】基板１としてのガラス基板上には各発光部に対応した部分に凸レンズ形状を有するマイクロレンズ２５が形成されており、基板１に対しマイクロレンズ２５と反対側の面に半透明反射層７、陽極層３、正孔輸送層４、発光層を兼ねた電子輸送層５、そして陰極層６が積層されている。

【００８９】まず、ガラス基板上のマイクロレンズ２５の作成方法について説明する。図８（ａ）に示すように、マイクロレンズ２５はレプリカ法により開口部の直径が７５μｍ、中心間隔が８０μｍのアレイを形成する。そして、実施例１と同様にしてマイクロレンズ２５と反対側の面に半透明反射層７を形成する。

【００９０】図８（ｂ）に示す様に、マイクロレンズ２５を形成した面と反対側の面に、マイクロレンズ２５に対応するように、ライン幅５０μｍ、ピッチ８０μｍの金属マスクを被せて陽極層３としてＩＴＯをスパッタ法により６０ｎｍ形成する。

【００９１】次に、図８（ｃ）に示すように、実施例１

と同様に正孔輸送層４としてＴＰＤを、電子輸送層５としてAlq_3を順次真空蒸着法により蒸着する。

【００９２】最後に、図８（ｄ）に示すように、ライン幅４０μｍの金属マスクをマイクロレンズ２５の列に直なるようにして被せ、陰極層６としてＭｇとＡｇを１０：１の蒸着速度比で共蒸着し、Ｍｇ／Ａｇが１０／１の合金を２００ｎｍ形成する。

【００９３】このようにして得られた有機ＬＥＤアレイに駆動用ドライバを接続し、電子写真用の光源として用いることで、良好な画像が得ることができた。

【００９４】

【発明の効果】以上説明したように、本発明によれば、高速、小型、低コスト、高精細であると同時に発光素子の発光した光量を効率よく利用可能な光プリンタヘッド等の露光装置及び画像形成装置を提供することが可能となる。

【図面の簡単な説明】

【図１】本発明の発光素子アレイの一例を示す斜視図である。

【図２】本発明の発光素子アレイの作製工程の一例を示す図である。

【図３】本発明の画像形成装置の一例を示す概略構成図

である。

【図４】本発明の画像形成装置の他の例を示す概略構成図である。

【図５】実施例１の感光体の分光感度と発光素子アレイの発光波長の関係を示すグラフである。

【図６】実施例２における発光素子アレイを示す断面図である。

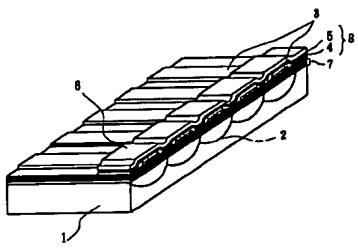
【図７】実施例３における発光素子アレイを示す断面図である。

【図８】実施例３における発光素子アレイの作製工程を示す図である。

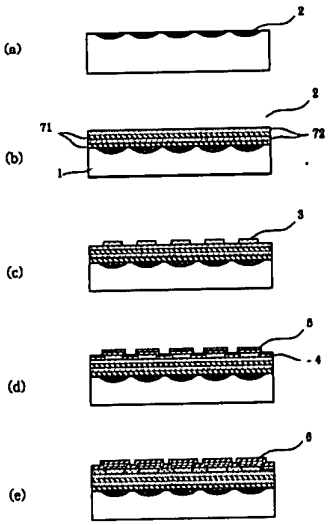
【符号の説明】

１　基板
２、２４，２５　マイクロレンズ
３　陽極層
４　正孔輸送層
５　電子輸送層
６　陰極層
７　半透明反射層
８　有機化合物層
７１　SiO_2層
７２　TiO_2層

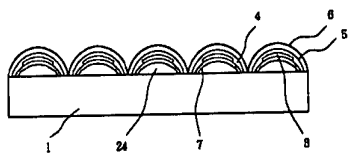
【図１】



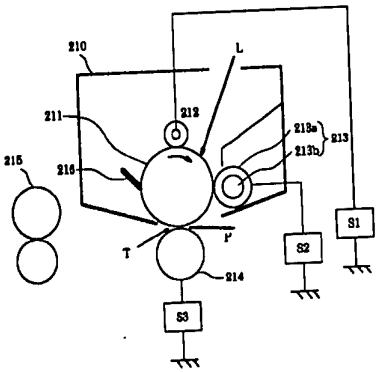
【図２】



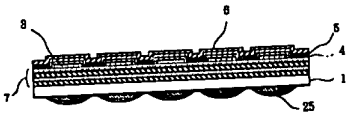
【図６】



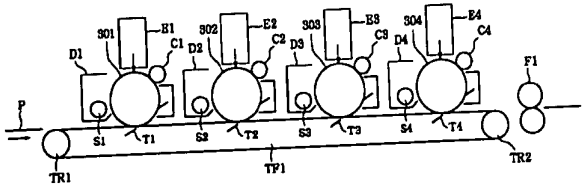
【図３】



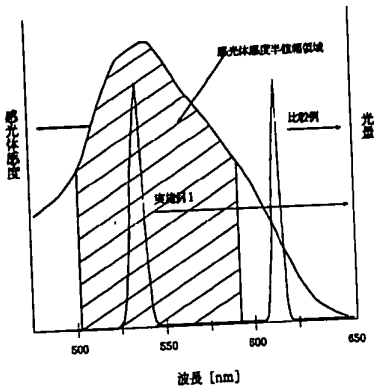
【図７】



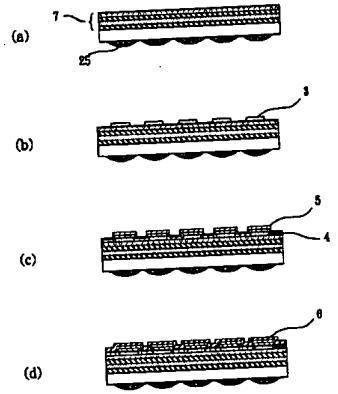
【図４】



【図５】



【図８】



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